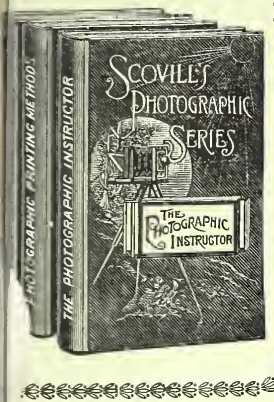


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THE present volume is the fourteenth of the series. The same generous response to our request for articles and pictures has resulted in a volume which we believe will be found by no means inferior to its predecessors. We take this opportunity to thank the many kind friends who have assisted us.

Owing to lack of space many interesting articles and pictures were crowded out. These will appear in the pages of The Photographic Times.

Suggestions for improvements will always be welcomed by

THE EDITOR.

New York, 1899.

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JANUARY, 1900.

1st MONTH. 31 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises.	N. Y. City. Sun sets.
			H. M.	H. M.
1	1	M	7 25	4 43
2	2	Tu	7 25	4 44
3	3	W	7 25	4 45
4	4	Th	7 25	4 46
5	5	F	7 25	4 47
6	6	Sa	7 25	4 48
7	7	☉	7 25	4 49
8	8	M	7 24	4 50
9	9	Tu	7 24	4 51
10	10	W	7 24	4 52
11	11	Th	7 24	4 53
12	12	F	7 23	4 54
13	13	Sa	7 23	4 55
14	14	☉	7 23	4 56
15	15	M	7 22	4 57
16	16	Tu	7 22	4 59
17	17	W	7 21	5 00
18	18	Th	7 21	5 01
19	19	F	7 21	5 02
20	20	Sa	7 20	5 03
21	21	☉	7 19	5 04
22	22	M	7 18	5 05
23	23	Tu	7 17	5 07
24	24	W	7 17	5 08
25	25	Th	7 16	5 09
26	26	F	7 16	5 10
27	27	Sa	7 15	5 11
28	28	☉	7 14	5 13
29	29	M	7 13	5 14
30	30	Tu	7 12	5 15
31	31	W	7 12	5 16

Moon's Phases.

New M., Jan. 1, 8 h. 52 m., morn.
First Q., Jan. 8, 0 h. 40 m., morn.
Full M., Jan. 15, 2 h. 7 m., eve.
Last Q., Jan. 23, 6 h. 53 m., eve.
New M., Jan. 30, 8 h. 22 m., eve.

FEBRUARY, 1900.

2d MONTH. 28 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises.	N. Y. City. Sun sets.
			H. M.	H. M.
32	1	Th	7 11	5 18
33	2	F	7 10	5 19
34	3	Sa	7 09	5 20
35	4	☉	7 07	5 21
36	5	M	7 06	5 22
37	6	Tu	7 05	5 23
38	7	W	7 04	5 25
39	8	Th	7 03	5 26
40	9	F	7 02	5 27
41	10	Sa	7 01	5 28
42	11	☉	7 00	5 30
43	12	M	6 58	5 31
44	13	Tu	6 57	5 32
45	14	W	6 56	5 34
46	15	Th	6 55	5 35
47	16	F	6 53	5 36
48	17	Sa	6 52	5 37
49	18	☉	6 51	5 39
50	19	M	6 49	5 40
51	20	Tu	6 48	5 41
52	21	W	6 46	5 43
53	22	Th	6 45	5 44
54	23	F	6 44	5 45
55	24	Sa	6 42	5 46
56	25	☉	6 41	5 48
57	26	M	6 39	5 49
58	27	Tu	6 38	5 50
59	28	W	6 37	5 51

Moon's Phases.

First Q., Feb. 6, 11 h. 23 m., morn.
Full M., Feb. 14, 8 h. 50 m., morn.
Last Q., Feb. 22, 11 h. 44 m , morn.

MARCH, 1900.

3d MONTH. 31 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	Sun sets. H. M.
60	1	Th	6 35	5 53
61	2	F	6 34	5 53
62	3	Sa	6 32	5 54
63	4	☉	6 30	5 55
64	5	M	6 29	5 56
65	6	Tu	6 27	5 57
66	7	W	6 25	5 58
67	8	Th	6 24	5 59
68	9	F	6 22	6 00
69	10	Sa	6 21	6 01
70	11	☉	6 19	6 02
71	12	M	6 17	6 03
72	13	Tu	6 16	6 04
73	14	W	6 14	6 05
74	15	Th	6 12	6 06
75	16	F	6 11	6 08
76	17	Sa	6 09	6 09
77	18	☉	6 07	6 10
78	19	M	6 06	6 11
79	20	Tu	6 04	6 12
80	21	W	6 02	6 13
81	22	Th	6 01	6 14
82	23	F	5 59	6 15
83	24	Sa	5 58	6 16
84	25	☉	5 56	6 17
85	26	M	5 54	6 18
86	27	Tu	5 52	6 19
87	28	W	5 51	6 20
88	29	Th	5 49	6 21
89	30	F	5 47	6 22
90	31	Sa	5 45	6 23

Moon's Phases.

New M., March 1, 6 h. 25 m., morn.
First Q., March 8, 0 h. 34 m., morn.
Full M., March 16, 3 h. 12 m., morn.
Last Q., March 24, 0 h. 36 m., morn.
New M , March 30, 3 h. 30 m., eve.

APRIL, 1900.

4th MONTH. 30 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	Sun sets. H. M.
91	1	☉	5 44	6 24
92	2	M	5 42	6 26
93	3	Tu	5 41	6 27
94	4	W	5 39	6 28
95	5	Th	5 37	6 29
96	6	F	5 36	6 30
97	7	Sa	5 34	6 31
98	8	☉	5 33	6 32
99	9	M	5 31	6 33
100	10	Tu	5 30	6 34
101	11	W	5 28	6 35
102	12	Th	5 26	6 36
103	13	F	5 25	6 37
104	14	Sa	5 24	6 38
105	15	☉	5 22	6 39
106	16	M	5 20	6 40
107	17	Tu	5 19	6 41
108	18	W	5 17	6 42
109	19	Th	5 16	6 43
110	20	F	5 14	6 44
111	21	Sa	5 13	6 45
112	22	☉	5 11	6 46
113	23	M	5 10	6 47
114	24	Tu	5 08	6 48
115	25	W	5 07	6 49
116	26	Th	5 06	6 50
117	27	F	5 04	6 51
118	28	Sa	5 03	6 52
119	29	☉	5 02	6 53
120	30	M	5 00	6 55

Moon's Phases.

First Q., April 6, 3 h. 54 m., eve.
Full M., April 14, 8 h. 2 m., eve.
Last Q., April 22, 9 h. 33 m., morn.
New M., April 29, 0 h. 23 m., morn.

MAY, 1900.

5th MONTH. 31 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises.	N. Y. City. Sun sets.
			H. M.	H. M.
121	1	Tu	4 59	6 56
122	2	W	4 58	6 57
123	3	Th	4 56	6 58
124	4	F	4 55	6 59
125	5	Sa	4 54	7 00
126	6	☉	4 53	7 01
127	7	M	4 52	7 02
128	8	Tu	4 51	7 03
129	9	W	4 49	7 04
130	10	Th	4 48	7 05
131	11	F	4 47	7 06
132	12	Sa	4 46	7 07
133	13	☉	4 45	7 08
134	14	M	4 44	7 09
135	15	Tu	4 43	7 10
136	16	W	4 42	7 11
137	17	Th	4 41	7 12
138	18	F	4 40	7 13
139	19	Sa	4 39	7 14
140	20	☉	4 39	7 15
141	21	M	4 38	7 16
142	22	Tu	4 37	7 17
143	23	W	4 36	7 18
144	24	Th	4 36	7 19
145	25	F	4 35	7 20
146	26	Sa	4 34	7 20
147	27	☉	4 34	7 21
148	28	M	4 33	7 22
149	29	Tu	4 32	7 23
150	30	W	4 32	7 23
151	31	Th	4 31	7 24

Moon's Phases.

First Q., May 6, 8 h. 39 m., morn.
Full M., May 14, 10 h. 36 m., morn.
Last Q., May 21, 3 h. 31 m., eve.
New M., May 28, 9 h. 50 m., morn.

JUNE, 1900.

6th MONTH. 30 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises.	N. Y. City. Sun sets.
			H. M.	H. M.
152	1	F	4 31	7 24
153	2	Sa	4 30	7 25
154	3	☉	4 30	7 26
155	4	M	4 30	7 26
156	5	Tu	4 29	7 27
157	6	W	4 29	7 28
158	7	Th	4 29	7 28
159	8	F	4 29	7 29
160	9	Sa	4 28	7 30
161	10	☉	4 28	7 30
162	11	M	4 28	7 31
163	12	Tu	4 28	7 31
164	13	W	4 28	7 32
165	14	Th	4 28	7 32
166	15	F	4 28	7 32
167	16	Sa	4 28	7 33
168	17	☉	4 28	7 33
169	18	M	4 28	7 33
170	19	Tu	4 28	7 34
171	20	W	4 29	7 34
172	21	Th	4 29	7 34
173	22	F	4 29	7 34
174	23	Sa	4 29	7 34
175	24	☉	4 29	7 34
176	25	M	4 30	7 35
177	26	Tu	4 30	7 35
178	27	W	4 30	7 35
179	28	Th	4 31	7 35
180	29	F	4 31	7 35
181	30	Sa	4 32	7 35

Moon's Phases.

First Q., June 5, 1 h. 58 m., morn.
Full M., June 12, 10 h. 38 m., eve.
Last Q., June 19, 7 h. 57 min., eve.
New M., June 26, 8 h 27 m., eve.

JULY, 1900.

7th MONTH. 31 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	Sun sets. H. M.
182	**1**	☽	4 32	7 35
183	**2**	M	4 32	7 35
184	**3**	Tu	4 33	7 34
185	**4**	W	4 33	7 34
186	**5**	Th	4 34	7 34
187	**6**	F	4 35	7 34
188	**7**	Sa	4 35	7 33
189	**8**	☽	4 36	7 33
190	**9**	M	4 37	7 33
191	**10**	Tu	4 37	7 32
192	**11**	W	4 38	7 32
193	**12**	Th	4 39	7 31
194	**13**	F	4 39	7 31
195	**14**	Sa	4 40	7 30
196	**15**	☽	4 41	7 30
197	**16**	M	4 42	7 29
198	**17**	Tu	4 43	7 29
199	**18**	W	4 44	7 28
200	**19**	Th	4 44	7 27
201	**20**	F	4 45	7 26
202	**21**	Sa	4 46	7 26
203	**22**	☽	4 47	7 25
204	**23**	M	4 48	7 24
205	**24**	Tu	4 48	7 23
206	**25**	W	4 49	7 23
207	**26**	Th	4 50	7 22
208	**27**	F	4 51	7 21
209	**28**	Sa	4 52	7 20
210	**29**	☽	4 53	7 19
211	**30**	M	4 54	7 18
212	**31**	Tu	4 55	7 17

Moon's Phases.

First Q., July 4, 7 h. 13 m., eve.
Full M., July 12, 8 h. 22 m., morn.
Last Q., July 19, 0 h. 31 m., morn.
New M., July 26, 8 h. 43 m., morn.

AUGUST, 1900.

8th MONTH. 31 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	Sun sets. H. M.
213	**1**	W	4 56	7 16
214	**2**	Th	4 57	7 14
215	**3**	F	4 58	7 13
216	**4**	Sa	4 59	7 12
217	**5**	☽	5 00	7 11
218	**6**	M	5 01	7 10
219	**7**	Tu	5 02	7 09
220	**8**	W	5 03	7 07
221	**9**	Th	5 04	7 06
222	**10**	F	5 05	7 05
223	**11**	Sa	5 06	7 04
224	**12**	☽	5 07	7 02
225	**13**	M	5 08	7 01
226	**14**	Tu	5 09	7 00
227	**15**	W	5 10	6 58
228	**16**	Th	5 11	6 57
229	**17**	F	5 12	6 55
230	**18**	Sa	5 13	6 54
231	**19**	☽	5 14	6 53
232	**20**	M	5 15	6 51
233	**21**	Tu	5 16	6 50
234	**22**	W	5 17	6 48
235	**23**	Th	5 17	6 47
236	**24**	F	5 18	6 45
237	**25**	Sa	5 19	6 44
238	**26**	☽	5 20	6 42
239	**27**	M	5 21	6 41
240	**28**	Tu	5 22	6 39
241	**29**	W	5 23	6 37
242	**30**	Th	5 24	6 36
243	**31**	F	5 25	6 34

Moon's Phases.

First Q., Aug. 3, 11 h. 45 m., morn.
Full M., Aug. 10, 4 h. 30 m., eve.
Last Q., Aug. 17, 6 h. 46 m., morn.
New M., Aug. 24, 10 h. 52 m., eve.

SEPTEMBER, 1900.

9th MONTH. 30 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises.	N. Y. City. Sun sets.
			H. M.	H. M.
244	**1**	Sa	5 26	6 33
245	**2**	☽	5 27	6 31
246	**3**	M	5 28	6 29
247	**4**	Tu	5 29	6 28
248	**5**	W	5 30	6 26
249	**6**	Th	5 31	6 25
250	**7**	F	5 32	6 23
251	**8**	Sa	5 33	6 21
252	**9**	☽	5 34	6 20
253	**10**	M	5 35	6 18
254	**11**	Tu	5 36	6 16
255	**12**	W	5 37	6 15
256	**13**	Th	5 38	6 13
257	**14**	F	5 39	6 11
258	**15**	Sa	5 40	6 09
259	**16**	☽	5 41	6 08
260	**17**	M	5 42	6 06
261	**18**	Tu	5 43	6 04
262	**19**	W	5 44	6 03
263	**20**	Th	5 45	6 01
264	**21**	F	5 46	5 59
265	**22**	Sa	5 47	5 58
266	**23**	☽	5 48	5 56
267	**24**	M	5 49	5 55
268	**25**	Tu.	5 50	5 53
269	**26**	W	5 51	5 52
270	**27**	Th	5 52	5 50
271	**28**	F	5 53	5 48
272	**29**	Sa	5 54	5 46
273	**30**	☽	5 54	5 44

Moon's Phases.

First Q., Sept. 2, 2 h. 56 m., morn.
Full M., Sept. 9, 0 h. 6 m., morn.
Last Q., Sept. 15, 3 h. 57 m., eve.
New M., Sept. 23, 2 h. 57 m., eve.

OCTOBER, 1900.

10th MONTH. 31 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises.	N. Y. City. Sun sets.
			H. M.	H. M.
274	**1**	M	5 56	5 43
275	**2**	Tu	5 57	5 41
276	**3**	W	5 58	5 39
277	**4**	Th	5 59	5 38
278	**5**	F	6 00	5 36
279	**6**	Sa	6 01	5 35
280	**7**	☽	6 02	5 33
281	**8**	M	6 03	5 31
282	**9**	Tu	6 04	5 30
283	**10**	W	6 05	5 28
284	**11**	Th	6 07	5 27
285	**12**	F	6 08	5 25
286	**13**	Sa	6 09	5 23
287	**14**	☽	6 10	5 22
288	**15**	M	6 11	5 20
289	**16**	Tu	6 12	5 19
290	**17**	W	6 13	5 17
291	**18**	Th	6 14	5 16
292	**19**	F	6 15	5 14
293	**20**	Sa	6 16	5 13
294	**21**	☽	6 18	5 12
295	**22**	M	6 19	5 10
296	**23**	Tu	6 20	5 09
297	**24**	W	6 21	5 07
298	**25**	Th	6 22	5 06
299	**26**	F	6 23	5 04
300	**27**	Sa	6 24	5 03
301	**28**	☽	6 26	5 02
302	**29**	M	6 27	5 01
303	**30**	Tu	6 28	4 59
304	**31**	W	6 29	4 58

Moon's Phases.

First Q., Oct. 1, 4 h. 10 m., eve.
Full M., Oct. 8, 8 h. 18 m., morn.
Last Q., Oct. 15, 4 h. 51 m., morn.
New M., Oct. 23, 8 h. 27 m., morn.
First Q., Oct. 31, 3 h. 17 m., morn.

NOVEMBER, 1900.

11th MONTH. 30 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	Sun sets. H. M.
305	**1**	Th	6 30	4 57
306	**2**	F	6 31	4 56
307	**3**	Sa	6 32	4 54
308	**4**	☉	6 34	4 53
309	**5**	M	6 35	4 52
310	**6**	Tu	6 36	4 51
311	**7**	W	6 37	4 50
312	**8**	Th	6 38	4 49
313	**9**	F	6 40	4 48
314	**10**	Sa	6 41	4 47
315	**11**	☉	6 42	4 46
316	**12**	M	6 43	4 45
317	**13**	Tu	6 44	4 44
318	**14**	W	6 46	4 43
319	**15**	Th	6 47	4 42
320	**16**	F	6 48	4 41
321	**17**	Sa	6 49	4 40
322	**18**	☉	6 50	4 39
323	**19**	M	6 51	4 39
324	**20**	Tu	6 53	4 38
325	**21**	W	6 54	4 38
326	**22**	Th	6 55	4 37
327	**23**	F	6 56	4 36
328	**24**	Sa	6 57	4 36
329	**25**	☉	6 58	4 35
330	**26**	M	6 59	4 35
331	**27**	Tu	7 00	4 35
332	**28**	W	7 02	4 34
333	**29**	Th	7 03	4 34
334	**30**	F	7 04	4 34

Moon's Phases.

Full M., Nov. 6, 6 h. 0 m., eve.
Last Q., Nov. 13, 9 h. 37 m., eve.
New M., Nov. 22, 2 h. 17 m., morn.
First Q.. Nov. 29, 0 h. 35 m., eve.

DECEMBER, 1900.

12th MONTH. 31 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	Sun sets. H. M.
335	**1**	Sa	7 05	4 34
336	**2**	☉	7 06	4 33
337	**3**	M	7 07	4 33
338	**4**	Tu	7 08	4 33
339	**5**	W	7 09	4 32
340	**6**	Th	7 10	4 32
341	**7**	F	7 11	4 32
342	**8**	Sa	7 12	4 32
343	**9**	☉	7 13	4 32
344	**10**	M	7 14	4 32
345	**11**	Tu	7 15	4 32
346	**12**	W	7 15	4 32
347	**13**	Th	7 16	4 33
348	**14**	F	7 16	4 33
349	**15**	Sa	7 17	4 33
350	**16**	☉	7 18	4 33
351	**17**	M	7 18	4 33
352	**18**	Tu	7 19	4 34
353	**19**	W	7 20	4 34
354	**20**	Th	7 20	4 35
355	**21**	F	7 21	4 35
356	**22**	Sa	7 21	4 36
357	**23**	☉	7 22	4 37
358	**24**	M	7 22	4 37
359	**25**	Tu	7 23	4 38
360	**26**	W	7 23	4 39
361	**27**	Th	7 23	4 39
362	**28**	F	7 23	4 40
363	**29**	Sa	7 24	4 40
364	**30**	☉	7 24	4 41
365	**31**	M	7 24	4 42

Moon's Phases.

Full M., Dec. 6, 5 h. 38 m., morn.
Last Q., Dec. 13, 5 h. 42 m., eve.
New M., Dec. 21, 7 h. 1 m., eve.
First Q., Dec. 28, 8 h. 48 m., eve.

REFERENCE CALENDAR FOR THREE YEARS.

1899

	S	M	T	W	T	F	S
Jan.	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31	..	..	..	..
Feb.	..	..	..	1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	..	..	..	..
Mar.	..	..	..	1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	..
April	..	..	..	..	..	..	1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	..	..	..	..	..	..

	S	M	T	W	T	F	S
May	..	1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31	..	..	..
June	..	..	..	..	1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	..
July	..	..	..	..	..	..	1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	31	..	..	..	..	..
Aug.	..	..	1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	31	..	..

	S	M	T	W	T	F	S
Sept.	..	..	..	..	..	1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
Oct.	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31	..	..	..	..
Nov.	..	..	..	1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	..	..
Dec.	..	..	..	..	..	1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
	31	..	..	..	..	..	..

1900

	S	M	T	W	T	F	S
Jan.	..	1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31	..	..	..
Feb.	..	..	..	..	1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	..	..	..
Mar.	..	..	..	..	1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	31
April	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	..	..	..	..	..
	..	..	..	..	..	..	..

	S	M	T	W	T	F	S
May	..	..	1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	31	..	..
June	..	..	..	..	..	1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
July	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31	..	..	..	..
Aug.	..	..	..	1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	..
	..	..	..	..	..	..	..

	S	M	T	W	T	F	S
Sept.	..	..	..	..	..	..	1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	..	..	..	..	..	..
Oct.	..	1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31	..	..	..
Nov.	..	..	..	..	1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	..
Dec.	..	..	..	..	..	..	1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	31	..	..	..	..	..

1901

	S	M	T	W	T	F	S
Jan.	..	..	1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	31	..	..
Feb.	..	..	..	..	..	1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	..	..
Mar.	..	..	..	..	..	1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
	31	..	..	..	..	..	..
April	..	1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	..	..	..	..

	S	M	T	W	T	F	S
May	..	..	..	1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	..
June	..	..	..	..	..	..	1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	..	..	..	..	..	..
July	..	1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31	..	..	..
Aug.	..	..	..	..	1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	31

	S	M	T	W	T	F	S
Sept.	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	..	..	..	..	..
Oct.	..	..	1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	31	..	..
Nov.	..	..	..	..	..	1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
	..	..	..	..	..	..	..
Dec.	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31	..	..	..	..

ECLIPSES IN 1900.

NOTE:—*Local mean time for the latitude of New York City is used in reckoning eclipses, sunset and sunrise. Subtract four minutes to change the reckoning to Eastern standard time of 75th meridian.*

Moon's phases are calculated for Eastern standard time. "Morn," is understood to extend from Midnight to Noon; "Eve." from Noon to Midnight.

There will be three Eclipses this year, two of the Sun and one of the Moon, as follows:

I. A Total Eclipse of the Sun, May 28, visible as a partial eclipse throughout most of the U. S. The line of totality extends from Norfolk, Va., to Mobile and New Orleans.

	Boston.	New York.	Washington.
Begins	8.9 A. M.	7.49 A. M.	7.40 A.M.
Middle	9.29 "	9.10 "	8.55 "
Ends	10.50 "	10.31 "	10.11 "

II. A Partial Eclipse of the Moon, June 13. This is so small as to scarcely amount to more than a contact, and details are therefore omitted.

III. An Annular Eclipse of the Sun, November 22, invisible in America.

THE SEASONS.

SPRING begins.....March 20, 3 p.m.	AUTUMN begins.....September 23, 2 a.m.
SUMMER begins.....June 21, noon.	WINTER begins.....December 21, 9 p.m.

CHURCH DAYS.

Septuagesima Sun..Feb. 11	Good Friday.....April 13	Dominical Letter.....G
Sexagesima Sun....Feb. 18	Easter Sunday.....April 15	Epact.....29
Quinquagesima Sun Feb. 25	Low Sunday.....April 22	Lunar Cycle (Gold. No.) 1
Shrove Tuesday....Feb. 27	Rogation Sunday...May 20	Solar Cycle.....5
Ash Wednesday....Feb. 28	Ascension Thursday May 24	Roman Indiction.....13
Quadragesima Sun. Mar. 4	Whitsunday (Pent.) June 3	Julian Period.....6613
Mid-Lent Sun.....March 25	Trinity Sunday. ...June 10	Dionysian Period.....229
Passion Sun.....April 1	Corpus Christi . .. June 14	Jewish Lunar Cycle.....17
Palm Sunday.....April 8	Advent Sunday.....Dec. 2	

CHRONOLOGICAL CYCLES.

CHRONOLOGICAL ERAS.

The year 1900, which comprises the latter part of the 124th and the first part of the 125th year of the INDEPENDENCE OF THE UNITED STATES OF AMERICA, corresponds to the year 6613 of the JULIAN PERIOD; the year 7408-7409 of the BYZANTINE ERA; the year 5669-79 of the JEWISH ERA; the year 2653 since the FOUNDATION OF ROME, according to Varro; the year 2676 of the OLYMPIADS; the year 1616 of the era of DIOCLETIAN; the year 2560 of the JAPANESE ERA; the year 1317-18 of the MOHAMMEDAN ERA.

The 1st day of January of the year 1899 is the 2,415,021st day since the commencement of the JULIAN PERIOD.

The JULIAN CALENDAR, which is still used in the Russian Empire, dates twelve days back of our own—the GREGORIAN CALENDAR. Thus a letter from St. Petersburg dated January 1st was really written on January 13th.

The Russians generally use, in official documents and frequently in business correspondence, two dates, which they call "old style" and "new style"; and in Alaska three dates have been used on their documents, because the early navigators forgot to make allowance for the crossing of the 180th meridian in sailing from Siberia to North America.

LEGAL HOLIDAYS IN THE VARIOUS STATES.

JAN. 1. NEW YEAR'S DAY: In all States except Massachusetts, New Hampshire and Rhode Island.

JAN. 8. ANNIVERSARY OF THE BATTLE OF NEW ORLEANS: In Louisiana.

JAN. 19. LEE'S BIRTHDAY: In Georgia, North Carolina and Virginia.

FEB. 12. LINCOLN'S BIRTHDAY: In all States.

FEB. 22. WASHINGTON'S BIRTHDAY: In all States except Arkansas, Iowa and Mississippi.

FEB. 20. MARDI-GRAS: In Alabama and Louisiana

MARCH 2. ANNIVERSARY OF TEXAN INDEPENDENCE: In Texas.

MARCH 4. FIREMEN'S ANNIVERSARY: In New Orleans, La.

APRIL 13. GOOD FRIDAY: In Alabama, Louisiana, Maryland, Pennsylvania and Tennessee.

APRIL 19. PATRIOTS' DAY: In Massachusetts.

APRIL 21. ANNIVERSARY OF THE BATTLE OF SAN JACINTO: In Texas.

APRIL 26. MEMORIAL DAY: In Alabama and Georgia.

MAY 4. CHARTER DAY: In New York City.

MAY 10. MEMORIAL DAY: In North Carolina.

MAY 20. ANNIVERSARY OF THE SIGNING OF THE MECKLENBURG DECLARATION OF INDEPENDENCE: In North Carolina.

MAY 30. DECORATION DAY: In Arizona, California, Colorado, Connecticut, Delaware, District of Columbia, Iowa, Illinois, Indiana, Kansas, Maine, Maryland, Massachusetts, Michigan, Minnesota, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New York, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Tennessee, Utah, Vermont, Wisconsin, Washington and Wyoming.

JUNE 3. JEFFERSON DAVIS'S BIRTHDAY: In Florida.

JUNE 17. BATTLE OF BUNKER HILL: In Boston, Mass.

JULY 4. INDEPENDENCE DAY: In all States.

JULY 24. PIONEERS' DAY: In Utah.

SEPT. 3. LABOR DAY: In Alabama, California, Colorado, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Maine, Maryland, Massachusetts, Michigan, Montana, Nebraska, New Hampshire, New Jersey, New York,

Ohio, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia and Washington.

SEPT. 9. ADMISSION DAY: In California.

SEPT. 12. LABOR DAY: In Florida

OCT. 31. ADMISSION DAY: In Nevada.

NOV. 6. GENERAL ELECTION DAY: In Arizona, California, Idaho, Indiana, Kansas, Maryland, Minnesota, Missouri, Montana, Nevada, New Hampshire, New Jersey, New York, North Dakota, Ohio, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, West Virginia, Washington, Wisconsin and Wyoming.

NOV. 25. LABOR DAY: In Louisiana.

NOV. 29. THANKSGIVING DAY: In all States, though in some it is not a statutory holiday

DEC. 25. CHRISTMAS DAY. In all States; in South Carolina, the two succeeding days in addition.

SUNDAYS AND FAST DAYS are legal holidays in all States, which designate them as such.

ARBOR DAY is a legal holiday in Kansas, North Dakota, Rhode Island and Wyoming, the day being set by the Governor—in Nebraska, April 22; California, September 9; Colorado, third Friday in April; Montana, third Tuesday in April; Utah, first Saturday in April; Idaho, Friday after May 1.

EVERY SATURDAY after 12 o'clock noon is a legal holiday in New York, New Jersey, New Orleans, Pennsylvania and Maryland; and from June 1 to September 30 in New Castle Co., Del.

THERE are no national holidays, not even the Fourth of July. Congress has at various times appointed special holidays. In the second session of the Fifty-third Congress, it passed an act making Labor Day a public holiday in the District of Columbia; and it has recognized the existence of certain days as holidays, for commercial purposes, in such legislation as the Bankruptcy act, but with the exception named, there is no general statute on the subject. The proclamation of the President designating a day of thanksgiving only, makes it a holiday in those States which provide by law for it.

UNITED STATES AND TERRITORIES.

States and Territories.	Estimated Populat'n.	Capitals.	States and Territories.	Estimated Populat'n.	Capitals.
Alabama	1,800,000	Montgomery.	Montana	250,000	Helena.
Alaska Terr	40,000	Sitka.	Nebraska	1,275,000	Lincoln.
Arizona Terr	100,000	Phœnix.	Nevada	50,000	Carson City.
Arkansas	1,500,000	Little Rock.	New Hampshire.	402,250	Concord.
California	1,408,130	Sacramento.	New Jersey	1,950,000	Trenton.
Colorado	492,500	Denver.	New Mexico T.	282,900	Santa Fé.
Connecticut	875,000	Hartford.	New York	7,000,000	Albany.
Delaware	175,000	Dover.	North Carolina	2,000,000	Raleigh.
Dist. Columbia	280,800	Washington.	North Dakota	235,000	Bismark.
Florida	500,000	Tallahassee.	Ohio	4,794,816	Columbus.
Georgia	2,100,000	Atlanta.	Oklahoma Terr.	333,000	Guthrie.
Idaho	190,000	Boise City.	Oregon	480,000	Salem
Illinois	5,750,000	Springfield.	Pennsylvania	6,026,414	Harrisburg.
Indiana	2,900,000	Indianapolis.	Rhode Island	420,386	Providence.
Iowa	2,185,000	Des Moines	South Carolina	1,300,000	Columbia.
Kansas	1,389,777	Topeka.	South Dakota	400,000	Pierre.
Kentucky	2,200,000	Frankfort.	Tennessee	2,000,000	Nashville.
Louisiana	1,250,000	Baton Rouge.	Texas	3,400,000	Austin.
Maine	700,000	Augusta.	Utah Terr	275,000	Salt Lake City.
Maryland	1,620,500	Annapolis.	Vermont	344,000	Montpelier.
Massachusetts	2,773,758	Boston.	Virginia	1,775,000	Richmond.
Michigan	2,250,000	Lansing.	Washington	425,000	Olympia.
Minnesota	1,800,000	St. Paul.	West Virginia	1,005,000	Charleston.
Mississippi	1,625,000	Jackson.	Wisconsin	2,138,000	Madison.
Missouri	3,250,000	Jefferson City.	Wyoming	86,000	Cheyenne.

Grand Total, January, 1899. 77,803,231

DIFFERENCE IN TIME (FOR CABLE PURPOSES),

BETWEEN THE CITY OF NEW YORK AND THE PRINCIPAL FOREIGN CITIES.

LATER THAN NEW YORK.	H. M.		H. M.		H. M.	EARLIER THAN NEW YORK.	H. M.
Antwerp	5 13.5	Dublin	4 30.5	Rio de Janeiro.	2 3.2	Havana	0 33.5
Berlin	5 49.5	Edinburgh	4 43.2	Rome	5 45.8	Hong Kong	11 27.4
Bremen	5 31.0	Geneva	5 20.5	St. Petersburg.	6 57.1	Melbourne	9 24.2
Brussels	5 13.4	Hamburg	5 35.8	Valparaiso	0 9.3	Mexico City of	1 40.5
Buenos Ayres	1 2.4	Liverpool	4 43.6	Vienna	6 1.2	Panama	0 22.2
Calcutta	11 49.2	London	4 55.9	Halifax	0 41.5	Yokohama	9 45.5
Constantinople	6 51.9	Madrid	4 41.1				
		Paris	5 5.2				



PHOTO BY SCHLOSS, N.Y.

GRAVURE-PHOTOCHROME ENG. CO. N.Y.

MARIE MURPHY.

THE AMERICAN ANNUAL OF PHOTOGRAPHY AND PHOTOGRAPHIC TIMES ALMANAC FOR 1900

EDITED BY WALTER E. WOODBURY.

A FEW COMMON FALLACIES.

BY ALFRED STIEGLITZ.

General Underexposure of Hand Camera Shots.



THE ALCHEMIST. By EDGAR FELLOES

THERE is something remarkable about the fact that, however much may be written and preached about the desirability of giving hand camera snapshots full time during exposure, that dealers in photographic supplies, and even the manufacturers of the hand cameras and shutters, continue to advise beginners and others to give the shortest time possible when exposing. This virtually amounts to the advice of underexposing. There is a certain amount of reason in this madness, for what seems to be more desirable and beautiful to the uninitiated and untrained eye than a so-termed clear and brilliant negative, the love of the old-

fashioned photographer, which is the certain outcome of an undertimed negative, unless the photographer have the tricks of developing at his fingers' tips! But the beginner is hardly likely to be thus proficient.

In my long experience, of tens of thousands of hand camera negatives which have been shown me, fully ninety-nine per cent. were undertimed, and naturally the resulting prints were anything but satisfactory, if critically examined.

For this reason, let me urge beginners, and also many who consider themselves well advanced, to give their exposures more time, and they will be surprised at the decided improvement of their work generally.

Developing Snapshots.

Developing snapshots is another topic about which much has been written and said, and nevertheless the great majority of photographers continue to develop their plates with solutions which are much too aggressive.

Forcing is a fallacy; the greater the underexposure the weaker the developer and the longer the time of developing, is a maxim well worth remembering.

An all-around developer, which is excellent for the average snapshot, is the one-solution formula which comes with every bottle of metol. Instead of using it as recommended, it is preferable to dilute with three or four times the amount of water, and carry the developing until the image shall have nearly disappeared, as it will go back considerably in the fixing bath. The resulting negative is full of gradation, transparent even in the highest lights, and will yield prints with all makes of papers.

It might be here stated that many photographers when using the normal solutions, carry the development of their negatives too far, and that they are consequently much too dense.

The modern printing methods require negatives which are rather thin.

Thin Negatives and Platinum Paper.

Platinum paper is a great favorite amongst photographers



COWS AT PASTURE. By E NICOLAI.

for the reasons of ease of manipulation and beauty of the ultimate results.

For many years the manufacturers recommended the use of "brilliant" negatives for this process, and to a certain extent their advice was justifiable.

In the meanwhile, competition has been keen. There has been a tendency toward thinner negatives and the use of bromide papers, aristo, etc., etc. Naturally, the manufacturers of the platinotype paper have been compelled to somewhat alter their formulæ, so as to meet this competition.

The paper manufactured to-day yields beautiful prints from very thin negatives, and gives hard, crude ones from such as were recommended but a few years ago, unless manipulated with great skill. And yet this is not known generally, and photographers continue to follow the advice given years ago, with anything but pleasing results.

The paper manufactured to-day works "harder" and is less susceptible to moisture than that manufactured a few years since.

With the introduction of the improved Keiley method of local glycerine development and the writer's process of producing platinotypes in various tints, it may be said that a new field has been opened for platinum printers.

In order to obtain satisfactory results with these new methods, rather thin negatives are essential.

= = = = =

A METHOD OF "PLUMBING" THE SWING-BACK.

BY C. W. CANFIELD.



SOLEIL. By C. PUYO.

THEORY demands that the plane of the focusing screen, and the plate when substituted therefor, shall be parallel with the plane of the object, if flat. When applied to architectural and structural subjects, this means, in practice, that the vertical swing-back of the camera must be used to make the focusing-screen "plumb."

The method employed by Mr. C. M. Darling is novel to me, and has all the merits of simplicity. A pocket spirit-level some three inches long, and a small carpenters' "square" of the usual pattern, a metal blade in a wood handle, complete the outfit for ordinary out-door work.

After adjusting and focusing the camera, the metal part of the "square" is placed along the focusing screen, with the pocket level resting on the top of the horizontal arm. When the screen is vertical, the bubble will indicate it.

For copying drawings or other objects where it is necessary to tip the camera up or down, a square with adjustable blade must be used; and the angular relation between the plane of the drawing and the horizontal can be thereby duplicated with the focusing-screen.

SOME PHOTOGRAPHIC NOTES ON STATEN ISLAND.

BY NEWTON W. EMMENS.



"COLUMBIA." By EDGAR FELLOES.

I HAVE frequently seen in the various photographic periodicals pictures of Central Park, Prospect Park, and Bronx Park, but never have I seen any pictures of Staten Island scenery, notwithstanding the fact that the locality in question affords views equal to anything observable in the parks and has also many houses and places of historic interest.

Perhaps that is because the majority of people consider Staten Island the abode of the mos-



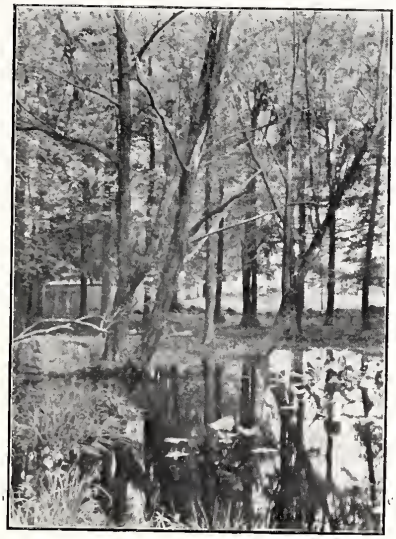
FINGERBOARD ROAD. By N. W. EMMENS.

quito or a by far too out-of-the-way place to visit. Any such idea is, however, mistaken; for mosquitoes are not plentiful and the prettiest parts of the island can be reached within one and a half hours from the City Hall of New York, while the sail across the bay, of some half hour's duration, is in itself well worth taking, to say nothing of the chances for some choice marine views.

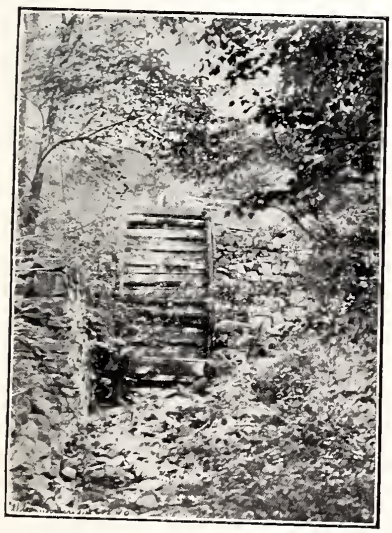
Those amateurs who ride a bicycle will derive a double pleasure from a visit to the island, as most of the roads are macadamized and are well adapted for wheeling, as may be judged from the illustration, "Fingerboard Road."

One of the prettiest places near St. George (where the ferry from New York lands) is what is known as the Clove Lakes. These are reached by taking the Staten Island Electric Railroad trolley running to Silver Lake or Richmond Turnpike, and going to the end of the line, a trip which takes about twenty minutes. From thence a walk of about five minutes straight ahead from where the car stops leads

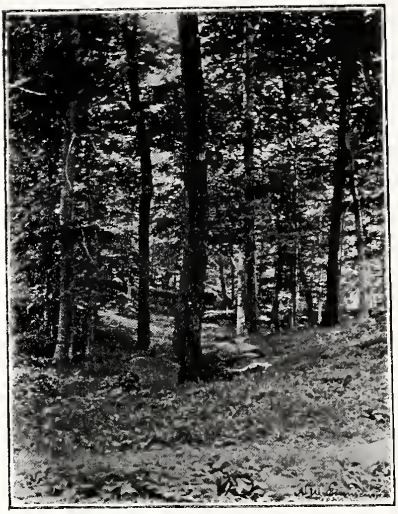
to a path which enters the woods on the right hand and continues parallel to the lakes for something like a mile and a half. If, before turning into this path, the road be followed for a hundred yards or so, a little "lily pond" will be found in the woods, just off the road to the left. This is well worth a plate. Returning and then taking the path beside the Clove Lakes, many picturesque views are seen. In one place, along the stream just below the dam of the first lake, are the remains of the "Brittain Mill Wheel;" a somewhat difficult subject, as the wheel is in such a position, relative to the surrounding trees and bushes, that there is practically only one point from which it can be photographed. Continuing on down the path, which is replete with pretty peeps, another of the lakes is reached, which also affords plenty of material for pictures. The dam below this lake is well worth taking and the woods in the immediate vicinity afford some delightful views, of which "A Woodland Scene" is an example. The next lake in succes-



LILY POND. By N. W. EMMENS.



BRITTAIN MILL WHEEL. By N. W. EMMENS.



A WOODLAND SCENE. By N. W. EMMENS.

sion adds further to the number of charming scenes; but too many plates should not be used on these, for below "The Dam" further on is a stream that demands several exposures, while the dam itself makes an exquisite picture. The path then follows the stream for quite a distance, until it finally makes a bend to the left, leaves the stream, and emerges into a street where a trolley car can be taken (with a change at Broadway and Castleton Avenue) back to St. George.

Another very pretty place is near Egbertsville, and is reached in about half an hour by the "Richmond" car on the Midland Electric Railroad from St. George. After leaving the car at Egbertsville, one has to follow the road (to the right) and take the first turning to the left. This is an old country road leading down into some woods intersected by the Richmond or Saw Mill Brook, over which is "A Rustic Bridge." The road itself traverses much beautiful scenery, and half a dozen plates can very profitably be used here. This place can also be reached by wheel over a splendid road, and by following the main highway instead of turning off into the woods the cyclist will be able to ride for some miles over the very finest thoroughfares in the State and through a most charming agricultural country. I strongly advise non-halation or backed orthochromatic plates (the latter preferred) being used in this work, as the sky showing through the trees is apt to cause halation.

There are furthermore quite a number of places and houses of considerable age and of interesting historic asso-



A RUSTIC BRIDGE.

BY N. W. EMMENS.



THE BARTON HOMESTEAD. By N. W. EMMENS.

ciations. The "Barton Homestead," for example, which was erected in 1670 by a Huguenot, is still inhabited, and is on the Richmond Turnpike, opposite the Moravian cemetery, at New Dorp. A little further on along the same road is the old "Fountain Homestead," built in 1668. It was occupied for some time during the Revolutionary War by Major Montresor (an aide-de-camp to Sir William Howe) and his family, with whom stayed Margaret Moncrieffe, a personage of considerable notoriety in the fashionable circles of Great Britain and France during the years 1780 to 1795. She was, during the latter part of her stay with General Putnam's family in New York, regarded as a British spy, and gave the Congress of that time no little concern. General Putnam finally obtained permission to send the lady in the barge belonging to the Continental Congress to Staten Island, where she remained till near the close of the war, when she returned to New York and was married to Captain Coghlan, and soon after went to London. The photograph of the house in question was taken in October, 1898, and since then the building has been entirely remodeled, so that it now has an entirely different appearance.



THE FOUNTAIN HOMESTEAD. By N. W. EMMENS.

Continuing along the Richmond Turnpike or Stapleton Avenue, as it is here called, for about a mile and a half, the town of Richmond (formerly called Cuckoldstown) is reached. The county seat was moved hither in the year 1729, previous to which time it had been at Stony Brook. Richmond is noted for its still-existing old St. Andrew's Church, which was built in 1713, and was for some time during the War of Independence occupied by British troops.

Above the church to the right is Richmond Hill, surmounted by the old "Latourette Homestead," the former headquarters of Lieut.-Col. Simcoe, of the Queen's Rangers. About two hundred yards in a southwesterly direction from the house, on the top of this hill, are the remains of earthworks and redoubts which were occupied by the British troops and which overlook the town of Richmond and Richmond Creek. The view from here is very fine, and on a clear day the Jersey shore can be plainly seen on the other side of Staten Island Sound. The view of the Latourette Homestead here given was taken last November, and the



LATOURETTE HOMESTEAD.

BY N. W. EMMENS.

subsequent heavy snows have doubtless completed the destruction of the roof.

At the lower end of the island near Tottenville, which can be reached either by wheel or train from St. George, is Bently Manor. The house was built in 1668, and is one of the oldest buildings on Staten Island. During the War of Independence it was used as a military barrack by the British. It was the home of the Billop family, and it was in this house that Benjamin Franklin, John Adams, and Edward Rutledge, acting as a committee appointed by the Continental Congress, and Lord Howe, commanding the British forces, met together on September 6th, 1776, for the purpose of "conferring on the issues of war, with a hope that peace might be established"; the result, however, being that no agreement was arrived at.

In the old basement of this house Fenimore Cooper laid one of the scenes in his tale, "The Water Witch."

And so I could go on naming place after place, all of which played a part in the early history of this country and the long-fought struggle that ended in the birth of the great American Republic.

I ought not, however, to conclude without mentioning the bathing beaches of Staten Island. South Beach, Midland Beach, and Richmond Beach all present opportunities for numerous hand-camera views in illustration of the summer girl and her swain disporting themselves in the cool water or basking in the sun. And should the "camera fiend" himself feel so inclined, he can spend a most enjoyable hour in the water or lying about on the sands; while an occasional schooner, run up on the beach for a load of sand, makes quite a pretty picture.

If these brief notes should induce any brother (or sister) photographer to bring his (or her) camera over to Staten Island and visit some of the places I have mentioned, I feel sure he (or she) will never regret the trip.

LACK OF PURPOSE.

BY E. LEE FERGUSON.



MISS PRISCILLA. By GEO. D. FIRMIN.

It is discouraging to pick up any of our photographic journals and carefully note the reproductions of photographs therein. Not one in ten shows any definite and determinable purpose on the part of the man behind the lens. Too often there will be found one or more persons who were in front of the lens, and whose evident determination was to stand as rigidly and awkwardly as possible and stare at one or more points. It is also evident that these points are devoid of interest, and that their entire thought is concentrated on what must be the beautiful result of the photographer's misdirected kindness.

Of course, so long as we have a vast army of button-pushers who pitch in, with the characteristic American spirit, to use up endless miles of film, we are doomed to endure much of this work. But this has been going on for some years, and it is time that determined effort should be made to call a halt.

If one walks about in the woods or fields where no signs concerning dogs or trespassing forbid, and sees a pretty flower, it is usually an easy matter to take it—in a literal

sense. This is not a great offense and does not seriously affect the community. But, unfortunately, if one armed with a folding camera—all latest improvements, backward and forward finders, front and rear swings, extra rapid roll-holder, neuralgic release, and extra wide-angle rectilinear single acrobatic lens guaranteed to give full exposure at $f/64$ on a dull day in $\frac{1}{300}$ of a second—take a tramp and see a tree, or a brook, or a picket fence, or a distant hill, or a girl (particularly the latter), his untutored eye admires the view and he forthwith "takes it." The broken flower will droop, wither, and quietly pass from existence; but the snap-shot is carefully nurtured, nursed on pyro-metol-hydro-rodi-ortol, bathed in hypo, given a bracer of alum, made acquainted with degenerate forms of silver, gold, and other valuable minerals—and eventually plagues not only near friends but a large circle of photographers who look over the pages of a photographic journal, hoping to find a little wheat among the chaff.

The remedy is to give everything done the proper amount of care. Study the capabilities of the lens and plate and the composition of the picture. I do not wish to be understood as meaning that the capabilities of the plate and lens are measured by the sensitometer number and the f value. Much after-work can be done on the plate in the way of intensification and reduction, both general and local. Masking and the use of two or more negatives may be resorted to—provided, always, an intelligent reason exists. One point that seems rarely considered by the average photographer is that of values, or tonality. It ought to be absurd to refer to dead black shadows and white paper skies, yet they are still the rule, and their end is not in sight.

Instead of exposing a roll of film under the impression that by so doing you are learning photography, sit down quietly and consider what a picture is. Go into an art gallery and study the works. Note the lines in the pictures, the points of interest, the values. Observe that one picture seems a connected whole, while another seems to be a number of good bits patched together. Ask yourself why

one picture is good and another poor. Then think these things over, and carefully make a few exposures. Study these results, and decide wherein you have failed to realize your intentions—being sure that you had intentions when you made the exposures! Cultivate this habit of having a purpose and of giving careful consideration to all details. Don't ask the advice of too many persons—study and reason for yourself. Get the criticism of a few recognized authorities —the harsher the criticism the better it should be for you—but do not accept that without reasoning over it. Make haste slowly, but do not get discouraged. While, however, there is no satisfaction so entirely satisfactory as self-satisfaction, a feeling of discouragement is more promising than an elation that may receive a rude shock when the return comes in from the next salon.



ON THE BOULEVARD. By R. DEMONT.



By C. H. WHITE

EVENING—Interior

ICE USED AS A LENS.

BY LIFE GRIFFIN.



THE BREAKING OF THE CLOUDS. By W. D. CLARK.

RECENTLY my attention was called to some particularly clear ice, so I determined to make a lens of some of it just by way of experiment.

There is nothing of interest in our back yard, and as to our front yard, we haven't any, so I must needs go abroad.

Armed with camera, ice, a concave saucer, and a convex glass, I started out on foot one bright February morning. As the day was somewhat warm, the shady side of the street was affected, and even then I anxiously spread my own shadow around my box of ice, which was suspended by a string and held as nearly at arm's length as would escape the ridiculous. Having arrived at my destination, my first care is to deposit my apparatus in a shady spot.

I have chosen as a field for my experiments the now deserted shipyards of Newburyport; and, as I look about me, I can but draw a sharp comparison. Not so very many years ago these yards were full of activity; great oak timber lay around and was being hewn into graceful curves by many men. Above the ceaseless echo of the mallets could now and then be heard the call of the ox-driver or the ring of the anvils. Ships were being built. But now, except for a seagull circling far above the water and the swiftly drifting ice off shore, all is quiet and undisturbed. In fact it is



PHOTOGRAPH MADE WITH AN ICE LENS.

an ideal spot for my experiments—there will be no critics, and here are pictures to be taken.

The writer having made these few experiments with ice and believing that much better results may yet be obtained, hopes that the accompanying illustrations (reproduced from original photographs), together with a short description of the manner of making the lens, will induce some fellow amateurs to make further experiments.

The first thing necessary is to make a suitable mount to hold the lens in place. One made of wood will serve admirably. It should be dipped in melted paraffine that it may withstand moisture, since the lens even on a cold day in winter will melt somewhat. The mount holding the lens can readily be adjusted in place of the usual one in any folding camera. As to the diaphragm and shutter, the writer's were made from cardboard and placed in front of the lens.

Next the ice, it should be clear and solid—not scaly, or it will cleave in working. Bubbles, if small, do not matter so much. It should be three-eighths of an inch in thickness, or at any rate considerably thicker than the finished lens is to be, as much waste is unavoidable.



THE COUNTRY DOCTOR.

BY L. W. BARRINGER, JR.

HOME-MADE DEVELOPING DISHES.

BY EDWARD SWINGLER.



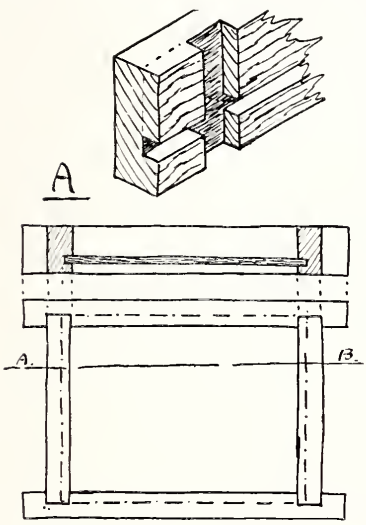
MAUD MULLER. By J. W. DUNN.

AMATEUR photographers are often handicapped from entering the realms of ambitious work by reason of the cost which a large plant entails, but who, nevertheless, look with longing eyes on the large work which is more and more crowding out the small from the walls of our exhibitions. To those who possess in their small photographs works of undoubted excellence, which only wait the enlarging apparatus to complete their ambitions, the following notes may be of some small use.

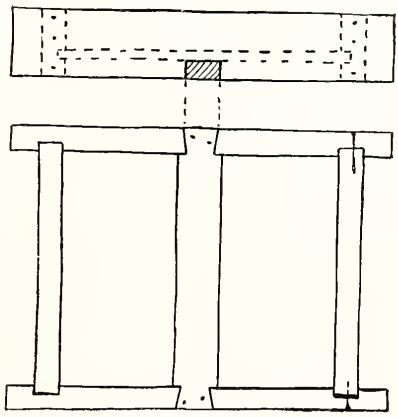
To the mechanically inclined, they may offer some useful work for the long winter evenings, and should offer no great difficulty to any individual of ordinary ability in point of construction.

With regard to small sizes, it is by far the better to buy them, for one can see at a glance that there will be the same number of joints to make as for large, and small dishes are by no means dear; but when we come to 12 x 10 inches and larger, the prices go up disproportionately. The methods of construction given in sketch A, and the sizes of material used, would suit equally well for all sizes, from 10 x 8 inches to 15 x 12 inches, and the largest shown at B up to 20 x 28 inches or so.

Some planed-up strips of pine-wood, 2 x ½ inches thick, have a 3/16 x 3/16 inch groove run along at half inch clear of the lower edge to receive the sheet glass (21-oz.) which



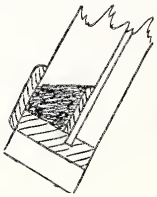
forms the bottom. The sides should be cut off 2½ inches longer than the longest dimension of the inside of the dish, and the two ends ⅜ inch longer. If care is taken to cut square, no planing of the ends will be necessary. The next thing to do is to set out the sides with the two grooves which are to receive the ends, so that they may fit tightly, and saw and pare out to exactly 3/16 inch deep, for which allowance has been made on the ends. It will be noted as the principle of the joint that the housings are of the same depth as the grooves for the glass, and consequently the glass grooves are sealed up when the ends are fixed in. It is better to make the wood impervious to water before fixing up, by applying a coat of ordinary varnish to the bare wood, as for boat-building, and not as house painters would do on a coating of size, as this, although giving less sheen to the finished work than the latter method, is more suitable to withstand long soaking of liquids. When this first coat of varnish is hard, some white lead should be used to bed the glass in with (which should have been cut ¼ inch larger than the inside dimensions of the dish each way), and the glass groove partly filled



B

up with it on each piece. It is better not to put any lead in the joints of the sides, as it must keep the sides off somewhat, and so upset the calcualtion of lengths, but a little varnish put on just before nailing up will serve to caulk the joint. Of course, in the case of faulty joints, the lead can be used as stopping. To fix up, the two ends can be put into one side, which is laid out flat on a bench, and the glass inserted in the grooves, and the remaining side put on, and then gently rubbed down with the hands, until the lead has oozed out beside the glass, and the joints have come together. Then, with two or three nails in each joint carefully put in, the whole thing is fixed up, and no fear need be had of the glass breaking under the nailing of the joints, as glass is very strong on its edge, and the lead has a cushion effect, and prevents any possibility of fracture. I may say, I have made many various sizes, and have had no such mishap. The joints can be best cleaned out of the superfluous lead, and made good where they show holes on the following day, as it has then somewhat set. Two additional coats of varnish on the wood work complete a dish that, with care, will last many years.





C

With the larger sizes, I would recommend sides 3 to 4 inches wide, and ⅝ to ¾ inch thick, and also the insertion of ties across the bottom, as shown in sketch B, and the glass groove raised to suit the thickness of the wood used. These should be dovetailed in and nailed, and just a word of warning here, the nailing of these is in the thickness direction of the glass, and requires much more care than at the side joints. The small groove could be cheaply run in for those unable to accomplish that part for themselves by the local carpenter who supplies the wood. In the hands of the amateur, I should say this construction is likely to prove more efficient than the more difficult dovetail joint, and it makes a good and strong useful article,

and would be found a congenial recreation for the winter evenings.

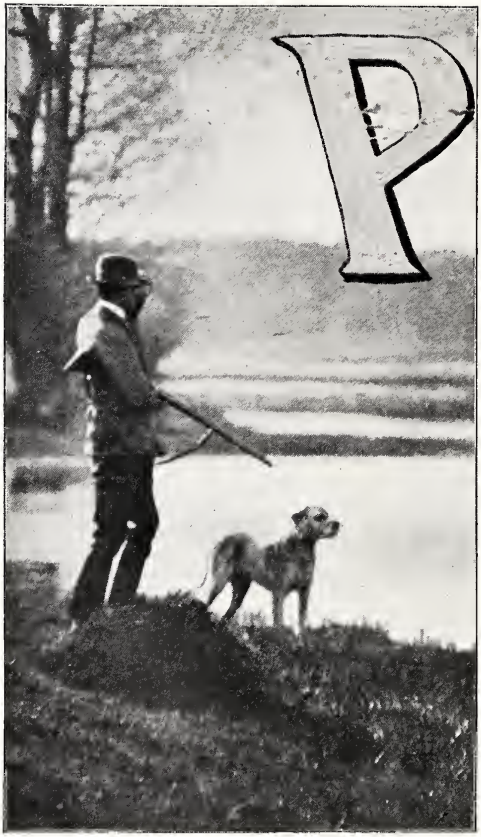
A useful addition may be made by enlarging the size of the dish by about three inches one way, and covering over the top to form a well, so that the negative may be examined without removing the developer from the dish, by simply raising it to a nearly vertical position, when the liquid would be retained in the well, as shown in the section sketch, C. The lower piece is cut in tightly between the sides to prevent the plate from sliding into the well with the liquid, the parts being made water-tight, as mentioned above.



FISHERMEN. By A. DARNIS.

A PRACTICAL ENLARGING APPARATUS.

BY FRANCIS BARKLIE



By COSTA.

PROBABLY no branch of photographic work is more urgently called into requisition by the recent advances in high grade photography, than the process of enlarging.

This is true of all kinds of camera productions, but perhaps more especially of artistic work, in which it is a requisite that pictures be of, at least, a sufficient size to be conveniently examined, and in which—a still more important point—a process may be applied, permitting the introduction of effects often the making of a picture from an artistic standpoint.

The necessity of a simple, yet efficient, enlarging apparatus having forcibly presented itself for several years, it is now my intention to describe an arrangement which, although theoretically devised, was constructed in a practical manner, and always with a view towards practical results.

Contact prints can be made from negatives 6½ x 8½, and upwards, that are quite satisfactory, so far as size is concerned; but it is in the great field of sizes smaller than this that the usefulness, if not indeed the necessity, of enlarging asserts itself; and, if the lens work of small cameras be good, there is no reason why they should not produce excellent enlarged prints.

After an investigation of a large number of the enlarging and copying cameras offered in the market, it appeared to me that their limitations were too easily reached, and after a considerable amount of experimenting I settled upon an arrangement, operated in the dark-room, capable of reducing as well as enlarging, which has proved itself reliable, efficient, convenient, and almost limitless in its applications.

Of course this arrangement requires a dark-room of sufficient, though not unusual, dimensions; and, as daylight is the source of illumination, it is desirable to have, if possible, direct access to the unobstructed sky, or as near it as may be.

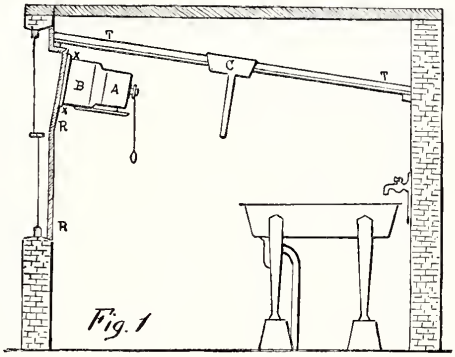


Fig. 1

The accompanying illustration, Fig. 1, shows the scheme of arrangement in a general way, and is followed by other cuts in which are set forth the separate parts of the apparatus, in detail, as adopted by the writer. Many changes may, however, be made to adapt them to special requirements without affecting their practical efficiency.

It will be seen that the upper sash of the window is the one utilized, and this in order to obtain better illumination, and also, to permit of the entire apparatus being suspended overhead, consequently in no way interfering with the working space which, in the usual order of dark rooms, is a mat-

ter of no small consideration. In order to get an unobstructed view of the sky, it will be found advisable, in most cases, to give to the whole arrangement an inclination, as shown, the amount of inclination being determined by the existing conditions of neighboring buildings, etc., etc.

The entire window opening is covered by the stationary shutter, RR, with the exception of the opening made to receive the enlarging-box, AB, which is secured into the opening at XX, by buttons of either wood or iron. As this arrangement provides for a sky view, no ground glass is required to diffuse or equalize light, nor is there any need for the usual reflector, so frequently the cause of uneven illumination. The enlarging box carries at one end, the negative, and at the other, the lens, and is later described in detail. The rest of the apparatus consists of the stationary track TT, Fig. 1, the construction of which is shown in Fig. 5, and the sliding carriage C, upon which the sensitive paper is attached or the plate applied, as later explained.

Although the arrangement is so simple as scarcely to require explanation, the separate parts are exhibited in the following illustrations :

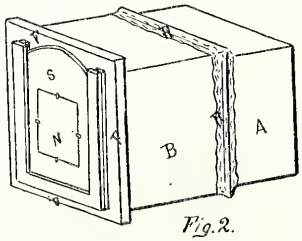


Fig. 2.

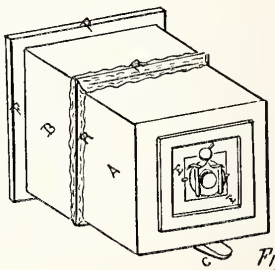


Fig. 3.

Fig. 2, a side view of the box, shows the end where the negative is received by means of the movable slide S, the negative being secured by four small buttons, as shown. There should be several of these slides having openings cut, respectively, for negatives, say, 4 x 5, 5 x 7, 6½ x 8½, etc., etc.

The box of which Fig. 3 shows the forward end, consists of two parts: The stationary section B, of which the face F F is the part fitting into the window opening, is connected with the movable section A, by a strip of rubber cloth at the joint. Section A is of a size to snugly telescope inside B, and as A carries the lens, the focusing is effected in this manner, the slack in the rubber cloth allowing of the necessary motion.

No dimensions are given since they must be determined by the focus of lens used, the size of the negatives, and the required amount of enlargement or reduction. It may, however, be well to mention that, in designing the box, its dimensions should be such that when A occupies its extreme position inside B, the shortest focus is reached, and corresponds to the greatest amount of enlargement required; and, to provide for an extreme of extension, such as would be needed in reducing, a small supplementary box is furnished, to one end of which the lens is transferred, while the other end is secured to the face of A, at the panel E, provided to receive it. In Fig. 3 is shown the end of the arm or bracket C, which is attached permanently to the under side of B, and its office is to support A, into the under side of which a screw is partially driven, so that its head rests upon the arm C, and slides back and forth in focusing.

The lens in all cases is attached, complete with lens-board, and secured by small buttons, as shown.

In Fig. 4 the carriage is exhibited in detail, S S in this figure, represent the slides which rest upon the track (see T, Fig. 1) and support the whole of this portion of the apparatus. The side-pieces, P P, connect the side pieces with portion F F, and are further braced by piece B, parallel to slides and fitted with a screw-eye shown by dotted line, by turning which the carriage can be fixed at any required position upon the track. The lower part or face of F is fitted with an opening about 2 inches in diameter, over which a bit of ground-glass is temporarily held when focusing.

Fig. 5 completes the arrangement, and represents the



STUDY. BY LE BEGUE.

screen, or surface, for carrying the sensitive paper. This is simply a flat board, B B, the size of the largest paper to

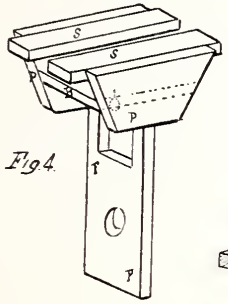


Fig 4.

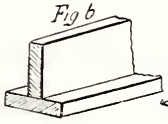


Fig 6.

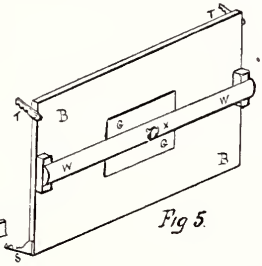


Fig 5.

be used, and fitted at the back with a stiff strip of wood, W, at such a distance as to allow of the admission of portion F of carriage, Fig. 4. The board has an opening in its center of, say, 5 x 7, into which is fitted, from the back, a piece of ground-glass, G G, and the back strip carries a screw-eye for the purpose of securing the screw-board in any position when adjusted to F, Fig. 4. For the purpose of accommodating a frame, in cases where blotting cloth is employed, the board is fitted with two short, fixed, toothed arms at the bottom, and two movable ones at the top—see S and T, Fig. 5.

The manipulation of the apparatus may be divided into three operations: insertion of negative, focusing of image, and application of sensitive surface. For the first, the entire box is removed from its position in the window; the negative is then inserted in the slide of suitable size, secured there by the buttons, the slide inserted in the box, and the whole returned to its position in the window. The negative should be placed upside down in the slide and facing in such a way as to assume the correct position in the finished picture.

The lens is attached to the front of the box, as before described; and if it be of the usual compound type, the relative positions of front and back lenses should be reversed so that the lens usually nearest the object will now be nearest

the negative. If the image is to be received upon a plate, the carriage is now brought into position, and both lens and carriage adjusted so as to obtain the required size and sharpness of definition. The aperture made in the face of F, Fig. 4, now permits of the focusing being done upon a bit of ground-glass through which the image is examined from behind, exactly as in a camera, which is a more satisfactory method than when the image is simply thrown upon a white surface and viewed from the front. Focusing being finished it only remains to close the lens, apply the plate by supporting it upon pins stuck in the face of the portion F of carriage, and then make the final exposure.

If the image is to be received upon sensitive paper the screen, Fig. 5, is employed. The front of this screen is covered with white paper upon which are traced in heavy black ink the usual sizes, 8 x 10, 12 x 15, 16 x 20, etc., etc., and in making the adjustment with regard to position, the screen is shifted about upon its support, and when in the correct position, secured by the screw-eye X, Fig. 5. The focusing is again done from the back through the ground-glass (this space not being covered by the white paper), the image being visible either through the hole or at same side of F, Fig. 4. The pins used for attaching the paper, or for the support of the plate, are the large black-headed steel variety. To attach the paper, it is best to insert into the track a pin to mark the exact position of carriage, and then to release the latter, slide it down to the extreme lower end of tract, and there apply the paper, returning it to its position as shown by the pin, before exposing.

I will mention one more accessory to the process in the shape of a light-tight box of a size sufficient to receive the screen-board. This box will be found very useful in cases where printing is to be done from extra negatives, as in clouds, etc., etc., as the screen-board, complete with print, may be enclosed within it while light is admitted into dark-room in changing the negatives. Its use is also to protect plates or sensitive paper before exposure, etc., etc.

So much for the apparatus. It is not the intention to

enter here into instructions as to the making of enlargements; that would, in itself, involve a subject quite sufficient for a separate article; but there have been given here, I believe, all necessary details for the construction and working of an apparatus by which, as will readily be seen by any one at all familiar with photographic methods, the operator can, most conveniently, apply the many means of modifying the final print, and thereby command the chief object, namely, control of results.

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WINTER.

BY L. H. FRIEDBURG.



THE SMOKER.
By L. M. McCORMICK.

IT is said of the people in the far East, that after reading for a short while they close the book and sit down (with or without using tobacco), thinking over what they have read. And it is added that the time occupied by this thinking business is longer than the time occupied by reading.

We, of the photographic fraternity, are forced into a similar position, as far as our business is concerned, during the long winter months, when days are short and when our magic wand, the light, fails. We then find plenty of time to think over, not what we have read, but what we have done. Our shortcomings and our successes pass review before us. We do not like it. We enjoy being busy, even if we do not belong to the class that is not happy if they have not snapped "a couple of dozen of plates" a day.

There is a way out of this monotony. Four things at the least may be profitably done during winter. In the first place, there will be *snow*, and snow-pictures are worth while taking. My little boy urged me, after one of our heavy

snowfalls and ensuing thaw, to put up a snow man. Of course I did it, since the remembrance of my own youth is saered to me. After considering that the life of a snow man is but short at the best, he had to be photographed. He vanished, it snowed and thawed anew, and another snow man, in another attitude, was the result. I never saw snow men photographed before. They look well. Then there were the boys of the neighbors, who competed with the Italians, and asked for clearing the sidewalk, two and a half feet deep, covered with snow. What can you do? Let them gain their pennies and photograph them besides.

But these are exceptional occasions. Let us then approach the second task. There are plates amongst the pile which you never attempted to print, Heaven knows why? Summer plates, they are. Let us try some. They are fine and have been forgotten in the turmoil of too much doing during summer. They bring along with them reminiscences of balmy weather, of hours joyfully spent, and they tell us at the same time what has passed and what is to come again.

Last, not least, we handle our spoiled plates. Some are particularly dear to us. Can they not be revived. Let us see. Here are under-exposed or under-developed plates. There is time enough to throw them away. Let us first try to intensify them. We only use one kind of intensifier. That is uranium nitrate. We consider this the best. Take one gramme uranium nitrate and dissolve in one hundred cubie centimeters of water (15 grains in 3½ ounces). Add to this 20 c.c. (⅔ ounce) of glacial acetie acid. Then dissolve 1 gramme of red prussiate of potash in 100 cubic centimeters of water, and add this solution to the first. Leave the plate in this bath until *every* black particle has been transformed into a reddish brown. But do not allow it to remain longer. Wash for an hour and dry. You will be astonished. You will not recognize your plate. If it has developed too dark for printing purposes, make a positive from it, and from this a negative, and you will have a flawless negative.



By J. CRAIG ANNAN

A FRIENDLY CALL

And ultimately. There *are* days when we may practice photographing indoors, without a studio, without flashlight. We choose a bright day and put our model near the window, reflecting light upon the dark side by means of a mirror or a white sheet. Or we study non-halation and photograph luminous objects.

Thus the winter is not so dull after all. There is time to study and time to work.



LIGHTING A WEED. By GEO. W. NORRIS.



NEWS-PHOTOGRAPHY.

BY GILSON WILLETS.



S. S. FLORIDA. THE LAST OF SHAFTER'S EXPEDITION TO LEAVE TAMPA.
By MRS. GILSON WILLETS.

NOT many months ago the newspapers depended, for pictures, almost entirely upon artists. The news was illustrated by sketches that sometimes resembled the real scene or person, but which usually looked like something or somebody else. All young women suicides, poisoners, and the like, were shown as the most beautiful creatures the artists could sketch. Events happening a thousand miles away were pictured "by our special artist on the spot," that is, by an imaginative disciple of the brush, sitting in the office of the newspaper that was paying for his sketches.

Now, all this slip-shod, any-old-way of presenting the news in picture is abandoned—by enterprising newspapers, at least. The artist has been supplanted by the photographer. Every newspaper of importance employs a staff photographer, who has his corps of assistants. To all parts of the city and the country—indeed, all over the world—the newspapers are sending photographers to gather the news with camera as well as with pen. These bright, active, daring men are now recognized as news-photographers, and their work is called news-photography.

News-photography is a sign-language. Who runs may read it. By means of this language the busy man can learn the news at a glance. This news-photography tells news-stories truthfully. None of the inaccuracies of the pen, no fiction, no exaggerating of facts, no news that is not news. A camera does not lie. It shows people as they really look, reproduces scenes with realistic exactness. No chance here for the city editor to make the ugly young woman suicide a beauty, no need of "faking" a picture of events that are happening on the other side of the world.



LAST GUNS TO SANTIAGO. By MRS. GILSON WILLETS.

And it is to be noted to the credit of the so-called yellow journals, that they were the first to adopt the camera—the truth-teller—in presenting the news. At increased expense the journals who make use of news-photography are obliged to use paper that will take hairpoints from a half-tone on a rapid press. The *New York Journal* was the first, the *World* followed, the *Herald* is now in line. So also are the leading papers of most of the large cities. Not that the newspapers were the original users of news-photography, for the weekly illustrated journals and the magazines used photographs long before newspapers printed any pictures

of any kind, even sketches. And to-day the weeklies spend a great deal more money for news-photography than the newspapers.



ARRIVAL OF LA GASCOIGNE TWO WEEKS OVERDUE.

The news-photographer's berth is no sinecure. He must get up before daylight to photograph a celebrity on an incoming ocean-liner. He must travel two or three hundred miles in a single day, hiring a section on a train, or a state-room on a boat, to be used as a dark-room in which to develop his plates in transit. He must sit up the remainder of the night to develop, to artificially dry, and to make platinum or bromide prints of the flash-lights which he has taken in the early evening—that he may deliver the photos in the early morning. During the war with Spain, he had to go to the front and make pictures, amid every difficulty and without a single convenience, as best he could. He must go out in a blizzard and make storm scenes. He must stand all day and all night, too, in wait for the coming or going of a personage of news-importance. Let him fail to



MAJOR-GEN'L FITZHUGH LEE ARRIVING AT JACKSONVILLE.
By MRS. GILSON WILLETS.

get a single photograph which he went to make and, if he is on the staff, he is in danger of losing his position. Let him fail thrice and he is peremptorily dismissed.

Meantime he gets a good salary while on the staff, and excellent pay if a free-lance. One free-lance news-photographer in New York, that I know of, will not take his camera out for less than fifty dollars. Others get five dollars each for negatives, and sometimes an extra allowance for their time. When employed for a special purpose, the news-photographer's expenses are paid. If he makes pictures on speculation, he must, of course, pay his own expenses.

The best-known news-photographers in this country are Joseph Byron, who is most famous for his flash-lights; J. K. Hemment, of the *Journal* and *Leslie's Weekly*, who made such a fine record during the war; J. Hare, of *Collier's Weekly*, who also achieved a war record and who is such a persistent traveler; Vander Veer and Vander Wyde, the celebrity expert; Hare and Hart, who make a specialty of naval news; and Bidwell, who attends to horse events. Of all these, Joseph Byron stands at the head. His work always combines the qualities of timeliness and art. These men, and many others equally worthy of mention, are constantly on the jump, earning their money by the hardest, most nerve-racking kind

of labor. In Havana I saw Hemment and Hare and Hart, all three working themselves to skeletons, making photographs of the wreck of the Maine and the stirring scenes in Havana. Vander Wyde works day and night, giving the daily papers the story of the news in surprisingly fine pictures. Byron seldom gets but a few hours' sleep o' nights, because of the necessity of developing and having ready for delivery the next day the flash-lights of "first night" theatrical events, made during the evening.



NEWS-PHOTOGRAPHER HEMMENT IN THE FIGHTING-TOP OF THE SUNKEN "MAINE," TAKING PHOTOS OF THE WRECK.

It is obvious that the news-photographer must have a fine nose for news, must not flinch where others flee, must always look alive, give no quarter even to people who do not wish to be photographed. He is ordered to get a snapshot of a well-known society woman. He must follow that lady till he gets a chance to snap his camera, and he must press the button or uncap the lens at the right moment. I was with Byron one winter day, when he—and I, too—stood all day long in the bitter cold and blinding snow, at Lyndhurst-on-the-Hudson, to make a picture of Helen Gould when she should drive up to the castle door, on her return from the city. One hundred dollars was offered for this picture, but the reward was failure and two bad colds. Another



ROOSEVELT ON HIS STUMPING TOUR FOR GOVERNORSHIP.
By VANDER WYDE.

news-photographer was recently ordered to get a snap-shot of Mrs. O. H. P. Belmont. It was a case of dead or alive—get the lady at all hazards. We shadowed her for three days and at last got a flash-light of the great lady at night, just as she was stepping out of her carriage to enter Delmonico's ball-room. But, alack! even then the picture was only an excellent view of the lady's back. I had even a sadder experience recently in New York, when Admiral and Mrs. Sampson arrived from Cuba. I stood at the gang-way on board the ship, and when the Admiral began descending the boarding steps, I snapped my kodak. Then, anxious to get Mrs. Sampson also, I snapped again without having turned the film-holder. The result was a blurred photograph, showing neither of the subjects.

The news-photographer must sacrifice art for subject-matter. The subject is everything; the excellence or the



THE BLESSING OF THE BELL SHRINE AT AURIESVILLE, N. Y.



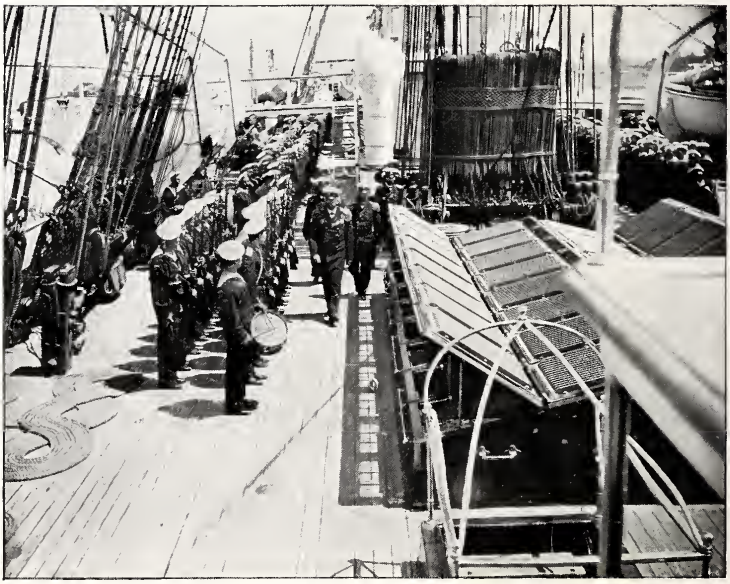
EMBARKING ON TRANSPORTS FOR SANTIAGO. By MRS. GILSON WILLETS.

demerits of the photograph count for nothing for or against the worker. The idea is, picture the news, whether the pictures are artistic or not. A poor picture of a public personage at a crucial, newsy moment is worth its weight in gold, while the finest, most artistic photograph of the same person at an unimportant moment, is not worth the paper it is printed on. There is no time for posing the subject, or for taking the scene from the best point. Get the subject in the act, get action in the scene; these are the main objects.

News-photography is news reporting, and the chief merit of a news-photograph lies in its timeliness. To-day the picture has a princely value, to-morrow no value at all. News-photographer Bidwell once sold a certain photograph of Cornelius Vanderbilt to one of the so-called yellow journals for ten dollars; ten minutes a rival paper offered twenty, fifty, a hundred, and actually two hundred dollars for a copy of that same particular photo.

An article of this kind should end with practical sugges-

tions regarding which cameras are best suited to news-photography. But as no one camera is best for all work or for all operators, I can only say that the news-photographers I know best find a six by ten the most useful and most convenient for all-round general work. An eleven by fourteen instrument, with a long focus lens, is found best adapted for sea work and long-range pictures. Shutters of a very rapid-acting type are an essential. When the use of these larger cameras is not always possible, a four by five snapshot will be of excellent service. Indeed, for ordinary outdoor work, the success of which depends upon making a large number of exposures in the smallest possible time, the four by five snap has been proved to be the news-photographers' best friend.



INSPECTION ON A RUSSIAN MAN OF WAR. COLUMBIA PARADE.



THE BRIDGE OF SIGHS—VENICE. BY M. TUKE TYLOR.

AROMATIC ORGANIC DEVELOPERS.

BY JAMES H. STEBBINS, JR., PH.D.

The number of organic reducing agents or developers, has so largely increased during the last few years, and their composition and behavior towards the photo-salts of silver is so varied that several attempts have been made to formulate a general law governing the behavior of these bodies.

From the investigation of Andresson and Lumière Bros., to whom we are indebted for much of the work done in this direction, the following law was gradually evolved.

All disubstitution products of the benzene series, containing two hydroxyls (OH), two amido groups (NH_2), or one hydroxyl and one amido group are developers, provided these groups stand either in the ortho or para positions with relation to each other.

Diphenyl derivatives must have these groups in the same benzene nucleus while in the naphthalene series the pairs of groups do not need to be in the same ring.

In the benzine derivatives, substitution of the hydrogen of the hydroxyl destroys the developing power, while a corresponding substitution of the hydrogen in the amido group may be actually advantageous, as the solubility in water and the reducing power of the compounds obtained is thereby increased.

As examples of such products I would mention methyl-o-amidophenol (ortol), methyl-p-amidophenol (Andresson's metol), and the homologous kresol compound (Hauff's metol).

Without going into details regarding the peculiarities and behavior of each of these products, I would like to say a few words concerning a comparatively new member of the family of aromatic developers, which has recently been brought to my notice, namely, "diphenal," or diamidodioxy-diphenyl, manufactured by the firm of Leopold Cassella & Co., Germany. This product is a diphenyl compound, and owes its existence to the researches of P. Jacobson, and his



AT LOW TIDE.

BY M. TUKE TYLOR.

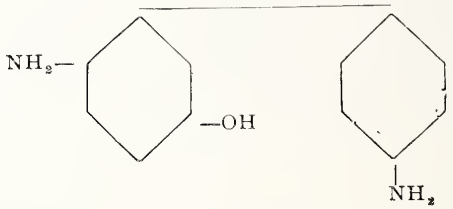
students, who found that the ethyl ethers of oxyazobenzene on reduction, are converted into semidine. Jacobson and H. Tigges have also shown that the acid-esters of this body are converted by acid reduction into diphenyl bases, of whieh diamidodioxy-diphenyl is a good representative. This particular product is prepared by the acid reduction of the acetic acid-ester of oxyazobenzene.

During its production, the acetyl-group is split off, with the formation of hydrazobenzene, which latter is finally converted into diamidodioxy-diphenyl, as follows:

$$\begin{array}{l} N{-}C_6H_4OC_2H_3O_2 \\ \| \\ N{-}C_6H_5 \end{array} \quad \begin{array}{l} \\ +H_4= \end{array} \quad \begin{array}{l} NH{-}C_6H_4OH \\ | \\ NH{-}C_6H_5 \end{array}$$

$$\begin{array}{l} NH{-}C_6H_4OH \\ | \\ NH{-}C_6H_5 \end{array} \quad = \quad \begin{array}{l} NH_2{-}C_6H_3OH \\ | \\ NH_2{-}C_6H_4 \end{array}$$

Diamidodioxy-diphenyl may probably be represented by the following graphic formula:



From this it will be seen that "diphenal" complies with the general law governing those compounds previously alluded to, inasmuch as it contains both a hydroxyl and an amido group in one benzene ring, in the para position in relation to each other, while in the second benzene ring it contains another amido group.

Diphenal is placed upon the market in the form of a solution ready for use, and in my hands has given most excellent results.

Here is what the manufacturers claim for it:

"We are convinced that the new developer, diphenal, will soon possess an extraordinarily wide adoption, and will increase in popularity. It combines the convenience of the



"BOULEAUX." BY C. PUYO.

rodinals with the excellent characteristics of the iron and pyro developers. We have used it for five months upon all kinds of negatives in extraordinary manners, and in view of these experiences we can certainly express our opinion of its remarkable value. The diphenal is equal to the iron developers in the extra clearness of shadows; it is unequalled in its freedom from fogs, while in the gradation and softness of half-tones it is equal to pyro. The greatest superiority of our new developer is its property of allowing extraordinary breadth of play in exposures. In this respect it is much more valuable than any other developer known, it being possible in even extraordinarily over-exposed plates to obtain negatives suitable for printing."

The directions for use are as follows:

For correctly exposed plates use:

Diphenal	1 part
Water	18-20 parts

For over-exposed plates use:

Diphenal	1 part
Water	20-25 parts

For under-exposed plates:

Diphenal	1 part
Water	8-10 parts

As already stated, I have given this new developer a thorough testing, and have found that it fulfils all the claims made for it.



SUNSET. By G. N. WARWICK.



By ALFRED WERNER

LOADING CLOVER

PRINTING PHOTO-MICROGRAPHS.

BY W. H. WALMSLEY.



By SARONY.

PERHAPS in no other branch of photography is the necessity of a clear, perfect print, showing the minutest details of the negative, so absolutely necessary as in that of photo-micrography. The chief aim in making the negative is to reproduce all details of the object visible in the field of the microscope. These, in turn, must be equally well shown in the print, otherwise all previous labor has been in vain. The most perfect of all prints is that upon a surface of glass, and a well-made lantern-slide may be regarded as the acme of perfection in this direction. It being necessary, however, that most of the printing should be done with a paper surface or medium, it is well to look carefully into the various kinds at our disposal in order to secure the best for the purpose.

The *ideal* paper should include many requisites in its complete make up. Among these are—good keeping qualities, ease of manipulation, sufficient sensitiveness to permit printing by artificial light, permanence of print, and a surface which keeps all parts of the picture, to the lightest tones on top, with no tendency to "sink in." If, in addition, it can be manipulated in ordinary light, not requiring the use of a dark-room, and is capable of yielding a variety of colors, from a rich ivory-black to sepia or red, without toning, it would seem to fulfil all reasonable requirements.

Now, what paper is obtainable that will give most if not all of these very desirable results? Not our old and tried friend albumen; for it must be freshly sensitized for the best work, cannot be printed by other than daylight, and

must be toned with gold or platinum in order to obtain a finished print. The same may be said of all the printing-out papers, whether they be collodion or gelatine. It cannot be denied that thoroughly well-made prints on any of these papers are both pleasing in tone and bear the image well on the surface (of course, the glossy ones are referred to, as matt papers are quite unsuited to microscopic work), but the necessity of daylight for printing, the extra labor involved in toning, and the evanescent character of all P. O. P. prints, tend to render them unsuitable for photo-micrography in the estimation of all who have a regard for the future of their present work.

Platinotype paper is good, very good; in fact, the only matt surface that is entirely suitable for our purpose; its great smoothness rendering the most delicate details of the negative with much fidelity. It requires no toning, and is absolutely permanent. *Per contra*—it will keep but a short time, and must therefore be freshly procured when needed, which is not always possible. It requires to be printed by daylight, and to have always a certain quality of negative to insure satisfactory prints. Moreover, it is somewhat costly, a matter of no small consideration to many.

Bromide paper is most excellent—nay, indispensable—for enlargements, and very well suited for contact prints of subjects which do not possess much fine detail. But for the delineation of these its surface is much too coarse, and they are practically lost. It can be printed, however, by artificial light and requires no toning, but all of the manipulations must be carried out in the dark-room. Of its permanence after printing there can be no reasonable doubt, whilst its previous keeping qualities are very great. On the whole, it possesses a greater number of the *desirable* qualities referred to in our list than any of the other papers that have been named. None of them, however—including the bromide—has them all. Each fails in one or more requirements.

Carbon tissue is most excellent as to results, but requires a degree of skill and experience in its use that few possess.



MOTHER AND CHILD.

BY E. NICOLAI.

It can be made to yield the very finest details if all necessary manipulations are carefully executed and the transfer be made to a perfectly smooth surface. Any desired tone or color can be had at will. The tissue will also keep indefinitely prior to being sensitized. Its use does not require a dark-room, but the printing cannot be done in other than daylight, whilst all of the operations, from sensitizing to finishing, require both time and experience that comparatively few have at command.

What, then, remains of printing processes in which can be found the ideal qualities set forth as being so desirable? It would seem well nigh impossible to combine them all in one, and yet it has been done. In the "Glossy Velox" paper we are furnished with a medium which seems, after several years of extended experience in its use, to be practically perfect. It is a modified bromide emulsion, sufficiently sensitive to permit printing by gas or lamplight with moderate exposures (rarely, if ever, exceeding a minute in duration), yet allowing all the necessary manipulation to be carried on in subdued daylight, or by that of a lamp, if its direct rays are not allowed to shine upon the paper during their continuance. The surface is extremely smooth and brilliant, bearing the image entirely on top, so that the most delicate details are rendered with absolute fidelity, whilst the print has no compeer in its superb velvety blacks, its snowy whites, and the beautiful gradations of half-tones it presents.

The image as made in the printing-frame is a latent one and must be developed. Most of the ordinary mediums *may* be used, but altogether the best is the Metol-Quinol—prepared by the formula accompanying the paper. This is very prompt in action, yields the most brilliant prints, is cleanly, may be used over and over again, and is cheap—all desirable qualities. If diluted with an equal quantity of water, and longer exposures be given, prints of warm brownish tones may be had. Uncompleted experiments with modified iron and other developers have given a variety of tones, including a rich Bartolozzi red, but these

are not sufficiently advanced to permit details being given as yet. Prior to development, the print must be soaked for a few seconds in water, until it lies limp and flat in the tray. As soon as the image is full out, and before too great density is reached, the developer must be poured off and the print flooded with water, slightly acidulated with acetic acid, to stop its further action. This is a very nice point to be arrived at, and the only one in all the operations requiring great skill, carefulness, and experience to reach always with certainty. Since, however, the perfection of the print depends very greatly upon stopping development at the exact moment, it is urged upon the worker to give special attention to this portion of it. After thoroughly washing in several changes of water or under the tap, it is to be transferred to an acid fixing bath, formula for which also accompanies each package of the paper. After fixing (which is accomplished in about fifteen minutes), the prints must be washed not less than an hour in running water, or, if this is not possible, in several changes. This is all-important, as the last trace of hypo must be eliminated to insure permanency and brilliancy.

In order to obtain the highest perfection in a glossy print, it should be finished by squeegeeing upon a ferrotype plate. It may seem to many quite superfluous to say anything anent this apparently well-known operation, but on the chance of aiding others, a few directions born of experience are given here. In purchasing the plates, those of rather heavy weight with perfectly polished surfaces and without blemishes should be selected. These should be cut across in halves, giving two sheets of 5 x 7 inches, each of which will hold as many cabinet or 4 x 5 prints, the usual sizes used for photo-micrographs. A tray should be provided a little larger than one of these sheets—say, 8 x 10 inches—and partially filled with water. Rinse the ferrotype plate beneath the tap, rubbing its surface gently at the same time with a tuft of cotton wool, but carefully guarding against scratching, and place it in the tray, polished side uppermost. Then take two of the prints from the tray

in which they have been immersed and *slide* them into the water, face downward, on to the ferrotype plate, in optical contact and without the slightest opportunity for any air to obtain a lodgment between the two surfaces of plate and print. Raise plate from tray, holding prints with fingers to prevent them from sliding off, and allow all superfluous water to drain away. Pass the edge of a smooth rubber squeegee quite gently over the backs of the prints, squeezing out all the water that can be removed in that way; then lay the plate on a dry towel placed upon a table top; cover it with a second towel, and pass the squeegee a number of times over the surface until the backs of the prints are quite free from all appearance of moisture, though, of course, the paper is still damp. They should now be put in a dry place and allowed to remain until the prints peel off their support spontaneously or with very slight assistance. On no account must they be removed by force or until quite dry. If these directions are carefully observed, the ferrotype plates will last for years without deterioration, and the squeegeeing of every print will be perfect. The drying process may be hastened at any time by placing the ferrotype sheets in a draught of air—as from an electric fan—or in the winter by putting them before a hot-air register, taking care not to get them too close to it.

But (there are always buts in mortal affairs) it sometimes happens, especially in hot weather, that a softening of the emulsion causes the print to stick to the plate "faster than a brother," in which event not only is it a total loss, but the ferrotype plate itself is usually damaged or ruined in the vain attempt to remove it. This is not an accident liable to occur to Velox only, but to *all* printing papers made with gelatine emulsions. Fortunately, it is not a common occurrence, but none the less provoking, as it generally occurs to one's choicest print. Looking for a remedy, or at least a palliation, I found a specific cure, or rather preventive, very simple, but none the less effective, so that among several thousand prints squeegeed since it was adopted I have not had a single one to stick in the slightest



ON A GREY DAY. BY GEO. W. NORRIS.

degree. The preventive is as follows: After the prints are thoroughly washed and freed from hypo, remove them to a bath of one drachm formaldehyde to sixteen ounces of water. It matters not how long they remain in this, but they are generally placed in it just before squeegeeing, and after all preparations for that operation are completed. From this bath, without draining or rinsing, they are removed to the squeegeeing tray containing the ferrotype plate. This is all. Follow it, and you will never have a print on any kind of paper stick to the plate.

The most general and beautiful method of printing a photo-micrograph is with a circular mask, leaving a margin of white paper about the print. And here we come in contact with the first and only defect thus far discovered in "Glossy Velox." This paper is very highly calendered, and it would seem that occasionally during this operation markings are left upon the surface, which are made visible so soon as the developer is poured over it, causing unsightly appearances and greatly marring the beauty and comeliness of the print. Fortunately again, we have a perfect and very simple *cure* for this disorder—not a *preventive*, as before. It is merely the ordinary ferricyanide reducer, or Farmer's solution, the formula for making which is known to everyone who ever dabbled in photography. After fixing, the prints bearing objectionable markings in the margins are to be removed to a dish of water without further washing. Taking one in the left hand, hold it over the dish containing the reducing solution and with a large, pointed camel's-hair pencil brush the fluid over the markings, which will almost instantly disappear. Care must be taken not to allow the reducer to run over the print, and a running tap of water should be at hand for frequent ablutions, until the whole is cleared off. It should then be placed in another tray of clean water, and when all the prints are thus cleared of markings, they must be washed finally to remove the hypo completely.

Glossy Velox is furnished in two grades. The "Ordinary" giving plucky prints from soft or even weak negatives; the other, or "Special," gives beautiful soft prints from strong or contrasting negatives. The paper is also finished with a matt surface suitable for many coarse microscopic objects.

A "WRINKLE" IN "COPYING," AND THE USE OF THE PROJECTION LANTERN FOR INSTRUCTION.

BY A. S. MURRAY.



EDNA WALLACE HOPPER. By SARONY.

THE pictures contained in two volumes of a very profusely illustrated work on surgery, making in the aggregate as many as six hundred negatives, were copied by me during the past winter.

From the negatives were made positives for the projection lantern, and used to illustrate the lectures before a medical class. I made the negatives on plates 3¼ x 4¼, and focused and adjusted so that by contact the slides would be properly covered by the conventional and commercial "mats."

I found that at first, although I had carefully drawn with lead-pencil on the ground-glass of my copying camera the size and shape of mats employed, the marks were difficult to distinguish under the focusing cloth. In a great many instances—I might safely say nine-tenths of the negatives made—I found the "mats" would not properly cover. So in thinking over a remedy for my trouble, I struck upon the plan, which I carried into execution, of drawing the lines indicating the opening of the "mats" with colored aniline inks, employing a different color for each size and shape. Then all my vexation disappeared, and I found I had no trouble when I came to mount the "slides." I made the lines on the ground side of my focusing screen, using a fine pointed pen for the purpose.

In this connection, I would like to advocate in the strongest manner the employment of the projection lantern for the illustration of lectures before the classes on all educational subjects.

Photographic slides for the lantern are now so readily made of any printed, drawn, or photographed matter, the projection is simple and effective; particularly is this the case when electric light is made use of. All one is called upon to do is to turn a switch or push a button, and have a light strong enough to illuminate any subject, when the lantern is a fixture in the lecture room. One or more slides are shown with as little trouble and preparation as one may have in hunting up chalk and cleaning the blackboard for a sketch or diagram, etc., which cannot be nearly so lucid or graphic as when the drawing is made small and carefully at one's leisure, this then photographed, and enlarged by the lantern objective to such a size that the entire class, no matter how large, can readily see and become familiar with any small part of it. In the work referred to in the commencement of this article, which I have lately been doing, the slides were made from the illustration in the books, the author of which was the lecturer. The pictures were drawn from photographs made at time of and during the operations, autopsies, specimens, etc. The projection of these before the student class was vivid and entertaining; such an object lesson makes a deep impression upon one's listeners. The pictures, when properly arranged, serve the lecturer as his notes. The care of these slides, and the space occupied by them, is insignificant as compared with that of the costly and bulky charts usually employed.

So on one might give one good reason after another for the adoption of this method of class instruction. But the very best advice is: *Try it yourself.*



MIDST THE TALL TREES THE SHADOW'D GRASS.

BY GEO. W. NORRIS.

GOLD SAVING.

BY OTTOMAR JARECKI.



By SCHLOSS.

PHOTOGRAPHY is the art of unlearning old rules. It used to be a most simple matter to recover gold out of old toning baths. True, there was always the bugaboo of throwing down iron with the gold. Personally, that has been the least of my troubles. When iron does happen to be precipitated, it is not a vicious metal to get rid of; a little patience and sulphuric acid will get rid of it.

The method of recovering gold is now, of course, practically the same as heretofore. There is this difference, however. Supposing a strong clean solution of sulphate of iron is at hand, the addition of, say an ounce of this to the pint of bath will precipitate the gold, if all goes well. It is necessary in all cases to acidify the iron solution, and here is the critical point. It is the writer's experience that more than one minim of sulphuric acid to the ounce of iron solution will make trouble. The iron solution can be made up of twelve ounces sulphate of iron, a quart of water, preferably warm and forty minims of acid. This solution should be filtered or allowed to settle clear and should then be bottled tight. The spent toning bath can be poured into a jar or wide mouthed bottle of a gallon capacity and the iron solution added as mentioned. If all goes well the gold will go down—and possibly some iron—in an hour's time, as a brownish sediment. By the next toning, or whenever the bottle gets too full, the liquid can be poured off and thrown away to make room for the next batch of bath. The process is thus continuous. It often happens, however, that the

gold will not precipitate after weeks of standing. The solution will turn wine color, then through handsome shades of purple to indigo blue, but all of which indicates that the gold is still in solution, or some condition of suspension. The cause of this is probably that some slight amount of gelatine and perhaps other constituent of the emulsion on the paper goes into the toning bath and obstructs the action of the iron. Whatever the cause, the remedy is simple and that is to counteract the acid in the iron solution. Put in a dash of soda solution—carbonate or bicarbonate, stir the whole and await results. Give it half a day or so to make up its mind and if the colors still persist, add more soda and watch and wait. When the liquid changes to rust color and the precipitate is brown and flaky, this part of the process is complete. The writer has tested this, time and again, and always with good results. When enough sediment has collected to seem worth while, decant the liquid and pour the sediment into a two quart bottle and fill up with water, again acidified with one minim of acid to the ounce of water. It is not necessary to take a week off to attend to these matters, but they can be looked after at odd moments. The effect of the acid water will be to produce a layer of brownish liquid above the sediment (dissolved iron) and the solution should be stirred up occasionally and allowed to settle again until this coloration is no longer formed and the sediment has greatly decreased in bulk and has a blue black color. If at any time the solution should take on the red or purple colors, there is too much acid and the soda treatment has to be resumed and a weaker acid wash water should be substituted. But with the sediment at the blue-black stage, the liquid portion should be poured off as closely as possible and the sediment transferred to a thin bottom blown (not cast) glass tumbler, using clean water to rinse all into the tumbler. After standing, this water is poured off closely and the tumbler put on a sand bath and the water evaporated off until the sediment is mushy, then add *aqua regia* little by little until the gold is dissolved and there is only a grayish-yellow sediment (silver) left in golden colored liquid

—the black color having all disappeared. Evaporate down, not to dryness, but only until the color is deep red, and allow to cool. Dilute with a small quantity of water and filter out the sediment through a tuft of cotton, pouring a little water into the funnel to displace all the gold solution. Stir the filtrate and add about three times its bulk of the iron solution; give plenty of time to settle and add a little more iron, which will cause a farther precipitate if all the gold did not go down before. After settling, pour off the solution, wash a few times with acidulated water, then clean water, decant, and evaporate on a sand bath if in a hurry. Weigh the dry gold and convert it into chloride, same as treating the sediment, evaporate to "ox-blood" color and cool. Every 10 grains of the pure gold obtained will yield 18 grains of crystallized chloride of gold, hence dilute solution to your customary strength.

As we have mentioned, all this recovering process can be sandwiched into the routine of other work, and once understood is very simple. Why anybody should neglect this residue, as has been advised, and bother with the bulky and meagre silver waste, is strange to comprehend. On an average, just about half the gold put into the toning-bath can be recovered, and from a somewhat limited amount of work the writer has recovered a dollar's worth of gold on several occasions.

The matter of treatment for the recovery of metallic gold and its conversion into chloride, as just mentioned, has been treated somewhat in outline, as it is a well-known proceedure. Should there be any information required, the publishers will no doubt furnish the writer's address to anxious inquirers.

CONCERNING PHOTOGRAPHIC EXHIBITIONS.

BY DAVID GRAY ARCHIBALD.



MRS. LESLIE CARTER. By SARONY.

PHOTOGRAPHIC exhibitions are doubtless stimulating to the amateur and to the club, but it is rarely that one is given without an undue amount of dissatisfaction being caused, which could be avoided if there were more system used by the committees having such in charge.

The greatest trouble is, of course, in the judging, and there is where reform seems necessary; for, as it is now, pictures which are awarded prizes are often woefully poor in photographic value, a state of things which it would seem should not exist in these "photographic" exhibitions. A cause of this is that artists (not photographers) are asked to judge the pictures (perhaps I should say photographs), and they regard subject, light and shade, composition, and other art matters as of first importance and of more value than photographic excellence. No doubt there should be due regard paid to these, but where it is advertised that a *photographic* exhibition, *i.e.*, an exhibition of pictures produced by photographic methods, is to be held, it would seem to imply that photography had some right to consideration and that all prize-winning pictures would possess a degree of merit purely photographic.

The "lucky hit," which everyone that has ever used a camera has experienced, is not taken as a standard of a man's work, and the "lucky position" chanced upon and

backed by the merit of conscious selection and skill should hardly entitle one to rank among artistic photographers (meaning both artist and photographer), yet they are awarded medals "for (*conscious*) artistic choice," since it is never understood that chance-work is to win, which, were it so, would conduce to make an exhibition a lottery.

This unpleasantness could be avoided if the committee in charge would make it a rule that "every picture must possess a certain degree of photographic merit" to be allowed to compete, and of having two committees to judge the pictures—one to go over all the pictures submitted, passing upon the photographic side; and the other, composed at least in part of artists, to view the already accepted ones and award the prizes. By this method there would be the certainty of the winning pictures having photographic and art value; the art of photography would be benefited, as there would be the necessity of those contemplating entering pictures acquiring expertness in the use of the camera. Those who regard expertness in the use of the camera as a thing not worthy of serious consideration are reminded that all art is preceded by a certain mechanical expertness. Our art is more mechanical than almost any other and conscious control of the instrument is within the reach of all.



"SUNSET." By OSCAR MAURER.



By SARONY

PORTRAIT

TO MEASURE THE APERTURE OF A LENS.

BY CHAPMAN JONES.



BY SCHLOSS.

TO secure attention, it is necessary to say the same thing over and over again, and by the time that a measure of success appears to be secured, many new workers have come into the field with the old prejudices. This is my excuse for writing on a subject that has often been written on before.

The aperture of a lens system is not of necessity, nor generally, represented by the hole in one or any diaphragm included in the system. An ordinary terrestrial telescope has several diaphragms of various sizes, and no one of them represents the aperture of the instrument. Photographic objectives generally have only one diaphragm, but this is never the aperture of the lens, unless it is right in front, as in single-view lenses.

The aperture with any diaphragm is the diameter of the incident cylinder of light that is transmitted, and unless otherwise stated, always refers to parallel rays—that is, light from a source so distant that an increase of its distance would not affect the matter. This incident cylinder of light may be condensed so that it will pass through a very small hole, or it may be made divergent, so that it requires a comparatively large hole to let it through, but the aperture is not affected by such treatment if the light is transmitted.

A ready way to measure the aperture of photographic objectives is to focus a distant object, replace the focusing screen by a card that has a pin-hole in the middle of it, and then in a darkened room to put a candle behind the pin-hole so that it shines through it on to the lens. A cylinder of

light will now emerge from the front of the lens, and the diameter of this is the aperture sought. A piece of ground-glass may be held in front of the lens and the diameter of the disc of light measured; or a bit of bromide paper may be put in the lens cap, and after sufficient exposure it may be removed and developed and the diameter of the black patch measured. This method is applicable to all photographic lenses, and gives the real aperture corresponding to the diaphragm used.



SUFFOLK TREES. By CHAS. H. L. EMANUEL.

SNAP SHOTS.

BY ERNEST BROWN.



THE WATER CARRIER By E. BROWN.

MANY now-a-days go about the world with hand cameras and kodaks, but few really know how to use them. Press the button and we will do the rest, is all they think about at the time, snapping away at anything which takes his or her fancy, regardless of time of day, direction of light, etc. How disappointed and vexed you feel, especially after a long sea voyage, when reaching home, and have you had your films developed, you have only succeeded in getting one, or perhaps two, fair pictures of the places you have visited, whereas had you used a little more thought and judgment, you might have brought with you fifty, yes, or even one hundred good ones.

Some frequently find fault with the camera, others with the films, and even they go as far as to blame the one who developed and printed the pictures for them, when the trouble lies at their own door.

When taking groups, or any of your friends, on shipboard or elsewhere, never have them placed in bright sun light, for if taken in the sun you will find several dark and light patches all over the finished print; some one will appear with a very dark face with only a small white patch to



AN ANCIENT AGRORIAN FOUNTAIN. By E. BROWN.

mark the nose; another will have a streak of sunlight clear across the face, and so on.

Take a little trouble and choose some shady spot with a good light and suitable background (not the sea); have your subjects facing as near north as posible, and I will venture to say that you get a good picture each time.

(Groups under trees.) Here again will be trouble, unless taken on a day which is overcast, or else the trees stand in the shade, for the sunlight shining through the branches and leaves will invariably throw white patches on the face and person. The sun is our friend, but we must not make him our foe.

Now we will turn our attention to landscape for snap shots. Choose little bits which are well illuminated, for these make far the best pictures for the kodak; have the sun shining over your shoulder, while you yourself face the subject; do not attempt the exposure if it is shining right, or even



AGRORIAN WASHERWOMEN. By E. BROWN.

at the side of your lens, for you will only get a misty looking picture lacking in detail, even if you should shield it.

Garden scenes are great temptations for the snap shooter. In these is where he nearly always fails to secure good results. I would have you stop and think before you spoil—so to speak—a whole roll of films, perhaps your last, which you are apt to do. Avoid all bits which have very dense shadows, for you will find that you cannot get good results unless you give them time exposure. Take only such as are well lighted and have little or no detail to bring out in the deeper parts.



BY THE LAKE AT FURNAS. By E. BROWN

(Introduction of figures.) Do not place them in too prominent a position, nor yet a stiff and rigid pose, but rather choose the position and figure itself that will harmonize with the picture you wish to take.

The pictures here given will show you what can be done with a hand camera if properly used.

Two things must be thought about which are of great importance. First—Take note of your pictures, name of subject, number of film, time of day exposed, etc. This not only serves as a guide to yourself, but also to the one who develops for you. Second—Keep your camera

shielded as much as possible from the direct rays of the sun, for even if it is a kodak, and perfectly light-tight, the sun shining directly upon it is apt to fog your films.

These lines are written expressly for the travelling amateur with the hope that he may derive some benefit from them, and in the future he may take home work which will prove a pleasure to his friends, and a joy to himself.

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COPYING.

BY E. K. HOUGH.



By H. D ANADALE.

THE old hands may skip this article. It refers to some methods in reducing, enlarging, and other close camera work.

On undertaking this work the amateur is puzzled as to how to place his camera with reference to the object so as to get the size he wants on the plate. After many abortive attempts, he perhaps refers to the tables and formulæ given in the Annuals, but he is not familiar with formulæ, and the lens he is using has a focal distance of some inches and a fraction, while the

table is founded on focal distances of even inches. Or perhaps he does not know the focus of his lens.

It is necessary to know this, and you cannot assume that the focus marked on it is correct. The writer is using a high-grade lens of a leading maker which is catalogued and marked 8½ inches focus. It is actually 9¼.

To get the focal distance with sufficient accuracy for most purposes, focus on something a hundred feet or more away and measure the distance from ground glass to diaphragm. This measurement is best made by removing the lens and measuring from ground glass to flange and then carefully measuring and adding the small distance from flange to diaphragm. While the camera is focused on the distant object it is well to make a mark somewhere on it to show the exact point to which it is extended. It is easy then to measure from this any additional extension.

Knowing the focal distance and the size of the object to be photographed, the next thing is to determine the size it is to be in the picture. Supposing the object measures 10 inches, and it is to measure 6 in the picture. Six tenths is then the ratio of the image to the object, which is the result of dividing the former by the latter. It is convenient to know the ratio found in this way, but not really necessary. The actual sizes may be used in the necessary calculations, as well as the figures representing the ratio. Thus, if the object is 8 inches and the image 6 inches, the ratio is .75 or ¾, and in the calculations to be described you may use 8 and 6, or 1 and .75, or 4 and 3. If these be added together and multiplied by the focus, and the result divided by the figure representing the object, it will give the distance of the image from the diaphragm, while dividing by the figure representing the image will give the distance for the object. For example, with ratio of 6 to 10 and focus 6½ inches, the sum of 6 and 10 multiplied by 6½ gives 104. This divided by 10 gives 10.4, the distance for the image, and dividing by 6 we get 17.33, the distance for the object.

Making these calculations each time is inconvenient, and it is more satisfactory to have a table adapted to the lens or

lenses to be used, showing at a glance the distances for each ratio likely to be used. Such a table may be constructed by the method given, or perhaps more simply by the use of the following:

A	B	C	D	E
1 to .01	2	2	4	
9 " .10	1.9	2.11	3.61	4
8 " .10	1.8	2.25	3.24	
3 " .4	1.75	2.33	3.06	
7 " .10	1.7	2.43	2.89	
6 " .10	1.6	2.67	2.56	3
1 " .2	1.5	3.00	2.25	
4 " .10	1.4	3.5	1.96	
3 " .10	1.3	4.33	1.69	2
1 " .4	1.25	5.00	1.56	

Column A represents various ratios of image to object. In columns B and C are numbers with which to multiply the focal distance of the lens, those in B thus giving the distance of the image from the lens diaphragm and those in C the distances for the object.

When the camera is extended beyond the focal distance the exposure must be greater than would be required for that distance, with the same light and aperture. Column D contains numbers representing the amount of the increase. Thus, if the size of the image is the same as the object, ratio 1 to 1, the extension of the camera being double the focal length, the time is four times more than for that length. So, if by a meter or otherwise, the time for the focal length with a given aperture is ascertained, multiply by the number in this column, or it will be sufficiently accurate to use the figures in column E for those of D grouped together.

The writer has in constant use tables of this kind for each of the lenses used in this work, and has found them of great use.

If after focusing on an object without having determined on the size of the image it is desired to note the ratio it bears to the object, measure the distance that the camera is extended, divide by the focal distance of the lens and subtract 1. This gives the desired ratio. Thus, if the extension is found to be 11.4 inches, with a focal distance of 6½, the



PORTRAIT.

BY SCHLOSS.

latter divided into the former gives 1.6, which, on subtracting 1 gives six tenths as the ratio.

The table applies as well to enlargement if the ratios be taken as showing the relation of the object to the image, in which case column B refers to the former and C to the latter.

For those who are not provided with a camera specially arranged for this work, or with a slide for the camera, and who must use a tripod, it will be found convenient to set the lens at the required distance and place the camera as accurately as may be, having one leg of tripod extending backward. Slightly moving this leg will admit of quite accurate focusing, the sliding front being used to correct slight inaccuracies in position on the screen.

It will, of course, in many cases be found difficult to place the camera exactly, and especially when the subject is not all in the same plane. Such slight movement of the camera will often then be necessary.

In slide making, a table of the kind described is particularly useful, as it aids in making the adjustment quickly and with a degree of accuracy that often requires little or no change, especially if measurements are marked on the camera or on the support on which it slides. With a camera specially designed for this work the table is equally useful.



MOUNT S. MICHEL, NORMANDY. By M. TUKE TYLOR.



COIN DU FEU.

BY C. PUYO

"AROUND GOTHAM."

BY WALTER SPRANGE.



THERE is no doubt that a far greater variety of interesting subjects for exposure may be found in and around New York City than can be secured in any other place in the Union, and while those who reside in Gotham may prefer to seek other fields for their camera rambles, their country cousins are invariably only too glad to avail themselves of every opportunity of visiting New York, for the especial pleasure it affords them to make a few snap-shot souvenirs of their rambles there.

As a country cousin, the writer therefore presents a few views of familiar scenes about New York, which will no doubt prove to be souvenirs to many who have gone over the same ground in the past, and which may also serve as suggestions to other country cousins, who may be desirous of learning where to go and what to take, when making a brief visit to New York.



FERRY BOAT.

Of course, it is almost impossible to escape seeing Brooklyn Bridge during a visit to the metropolis, but it is surprising how few ever think of making exposures of it. From the city side it seems at first to be difficult of approach, but a little perseverance will result in finding many places of vantage for a view of it. The ferry boats always afford a

good chance, and a ferry boat is in itself a curiosity to our transatlantic friends.

Such a variety of views can be obtained of and from the



BROOKLYN BRIDGE.

bridge that one can well pass a whole day on and about it. The happy-go-lucky camerist, who has only to press the spring of a magazine camera, can here exhaust a whole roll of films and still leave more objects to be snapped off on future visits. The light may be on a different side another time, offering an entirely new roll of subjects; or the atmosphere may have changed; clouds above, perhaps; or a fog on the river. All objects present a different appearance under these changed circumstances, and, if the happy-go-lucky is also an enthusiast, such opportunities for retaking cannot be ignored.



PROMENADE, BROOKLYN BRIDGE.

But, whether an enthuslast or not, the devotee to the camera will find that after the entire bridge has been taken from either side, sections of it can also be selected for subjects to good advantage, and also

that many very fine birds'-eye views can be made from the altitude of its lofty span.

Across the bridge (in Brooklyn) the principal objects are centered around the City Hall, among them being the Court House, the Academy of Music, and Plymouth Church.



A BIRD'S-EYE VIEW.

Another entire day can be passed very pleasurably by visiting Prospect Park and Greenwood Cemetery. Trolley cars for both places leave from the bridge entrance in Brooklyn.

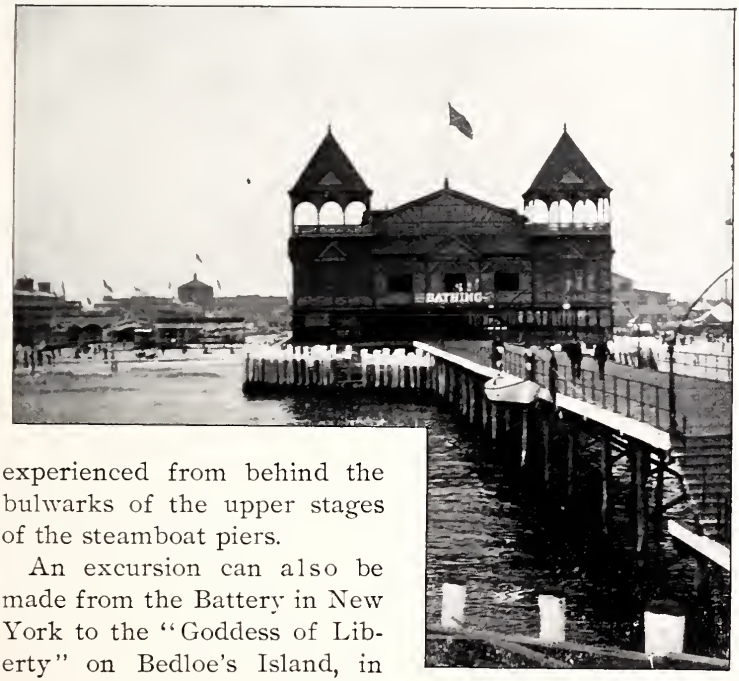
The gateway at the entrance to Greenwood Cemetery is one of the most chaste specimens of Gothic architecture in this country. The Washington Arch at the entrance to Prospect Park, a fine piece of modern work, is far superior in all its proportions to the arch of a similar character recently erected at the commencement of Fifth Avenue in New York. There are many choice bits of rustic scenery in Prospect Park, including lake views and sheep studies, so that one can always return from a visit there with a variety of pleasing studies.



ENTRANCE TO GREENWOOD CEMETERY.

It seems hardly necessary to add that the world-famed

Coney Island is on the further side of Brooklyn, or that it can be reached most readily from there. It always seems to a country cousin like the writer that the excursion to Coney Island should be made by steamboat from the Battery. Certainly, as a shore resort the place presents a more characteristic appearance when viewed from the water front, and, besides that, the vast amount of genuine glee to be derived from slyly snap-shooting the bathers can best be



A PIER AT CONEY ISLAND.

experienced from behind the bulwarks of the upper stages of the steamboat piers.

An excursion can also be made from the Battery in New York to the "Goddess of Liberty" on Bedloe's Island, in New York harbor. It is not until one has reached the Goddess, and has become lost in the labyrinth of her inner person, that a full appreciation of her majestic proportions can be obtained. Some of the finest views of New York's harbor can be secured from the statue and also from the lower level of the island itself.

Another charming excursion, also from the Battery, can be made to Long Branch. An entire day should be devoted



BATHERS, CONEY ISLAND.



LIBERTY, DISTANT VIEW.



By SARONY

MARIE STUDHOLME

to this trip, and the camera can be kept busy most of the time. Off Quarantine there are generally some recently arrived vessels awaiting clearance. Then Sandy Hook has to be passed, and that dreary spot requires the exercise of much talent if an artistic rendering of it is desired. A picturesque view of it is impossible to the writer or to anyone of his calibre! Sometimes fleets of fishing vessels may be met just beyond Sandy Hook, and if they are near enough for exposure, they invariably offer opportunities for good marine views.



OFF QUARANTINE, NEW YORK.

Long Branch does not now enjoy the popularity it did in the days of General Grant's residence there, but the fine beach at that place still attracts a large number of visitors during the season of bathing.

Old Fort Lee, up the Hudson opposite Riverside Park, has quite lost its old prestige, and the noble heights behind the hotels there no longer attract

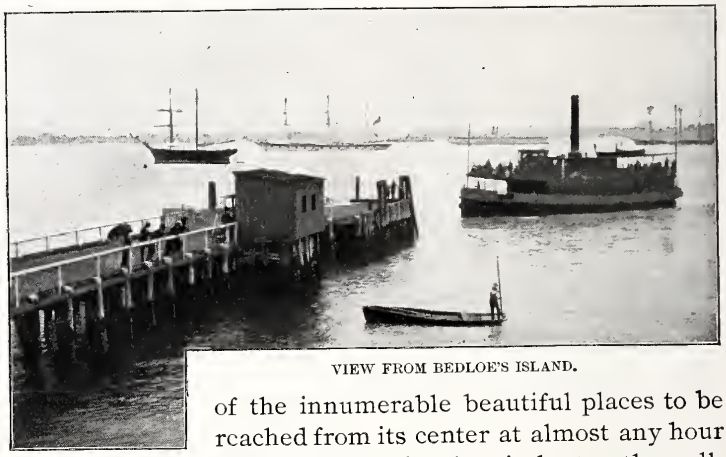


LONG BRANCH



OLD FORT LEE.

the large army of basket picnickers who frequented them in the past. No doubt much of this is due to the real estate agent and to the encroachment of factories by the river side. But, although one or two of New York's old resorts have become abandoned, that city has indeed reason to be proud



VIEW FROM BEDLOE'S ISLAND.

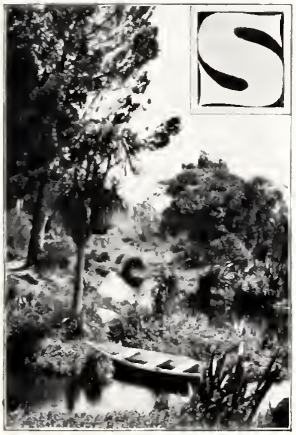
of the innumerable beautiful places to be reached from its center at almost any hour of the day, and, what is better than all, they are steadily improving in their general tone and character; and for excellence of cuisine and civility they will compare with the resorts of any city on the face of the globe.



ON FRENCHMANS BAY By H. F. PREETON

THE CAMERA IN WAR TIMES.

BY ALBERT GLEAVES, LIEUT. U.S.N.



By WALTER BURKE.

SOON after the blowing up of the "Maine," when the war clouds grew so dark and heavy that the breaking of the impending storm was daily looked for; when Key West suddenly found itself lifted into world-wide prominence by being made the base of supplies for the armada that was crowding its harbor and fretting its waterways, the photographers began to arrive from the north; every newspaper correspondant was armed with a camera ready to photograph everything and anything in sight. They were the avant-couriers of the army and navy.

Photographic material was in demand in those days, and the little stationery shop near the hotel did a thriving business in Kodaks of all kinds among the junior officers of the fleet, some of whom secured many valuable pictures of the memorable events that took place in the succeeding weeks.

With some men the making of pictures became a mania that found its culmination in grotesque situations at most critical times. Captain Evans of the "Iowa" tells a story of a midshipman who, during the chase of the "Colon" at the battle of Santiago, set up his tripod on top of a turret and was busily engaged in "getting the focus" of one of the Spanish ships, unmindful of the hurricane of shot and shell around him; "I think he got his snap-shot," says Captain Evans, "and he will probably remember for many years to come the few words I addressed to him."

No one who was in Key West the morning the first prize was brought in will ever forget the excitement that drove that sleepy town absolutely wild, when the news spread

that the "Nashville" was coming in with a Spanish prize. The entire community rushed to the quays, shouting, screaming, mad with excitement and patriotism. All sorts and conditions of men, women, and children, many of them with bare heads, thronged the sea wall, and everybody that owned a camera had it in his hand eager to make the first "war picture." The poor "Buenaventura," whose bewildered crew imagined that they were being led to the slaughter, had simply to run an unmasked battery of cameras that riddled her fore and aft from Fort Taylor to Curry's wharf.

During the sea skirmishes and battles of the war, various attempts were made both by professionals and amateurs to get photographs of scenes in action on board our vessels. Most of them were failures on account of the thick smoke clouds and the heavy deposits on the lenses of condensed saltpetre and powder gases. Moisture also spoiled many plates, and in one well-known case, a series of what would probably have proved most valuable and historic pictures, was utterly ruined after the battle of July 3d, by the careless submergence of the camera and roll in one of the ship's boats.

On the blockade there were great possibilities for the camera in fixing the stations of the vessels, and locating batteries and forts on shore, and establishing characteristics and contours of certain headlands on known bearings from seaward.

An outfit for use on board ship in war time should consist of a Kodak not less than 5 x 7, with a very wide quick working lens, a powder developer, and a generous supply of plates and roll films. Glass has the great disadvantage of weight, but it is certainly more reliable as to keeping qualities, especially in hot and humid latitudes.

In the next war, provided it does not come too soon, there will be no powder smoke to obscure the view, and we may expect clear reproductions of stirring scenes. The vitagraph man and the phonograph man will have a place on board ship and in the firing line on shore to catch and



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"MATED."

BY BAKER'S ART GALLERY.

preserve every phase of the battle ; so it does not require an especially vivid imagination or gift of prophecy, to predict that in the coming century we shall see and hear all the details of fierce battles reproduced in the theatres to after-dinner audiences. Suppose that there had been a vitagraph at Trafalgar, at Waterloo, or at Yorktown, and that we could look upon the bloody decks of the "Victory" where Nelson fell, at Ney's fierce charge against the English line, or the surrender of Cornwallis, just as we can now witness in any one of our large cities a bull fight in Madrid, or a skirmish in Manila.

The brief war has taught us many lessons, one of the most important of which is the use of the camera in skilful hands. No two men see a great event alike—in the excitement of battle, the human mind, it may be, is incapable of sober and correct estimation of times and distances.

Certainly it would seem so from the conflicting statements we have had from eye-witnesses of recent great happenings.

But the camera is unerring, unprejudiced, and absolutely correct.

Imagine a naval battle a year or so hence when smokeless powder will have been fully developed.

Suppose that in the fighting tops of each ship, an officer or other reliable person is stationed with a photometric camera to make simultaneous exposures on a roll at regular intervals. He would have a note-book properly ruled, in which he would note at each exposure, the time, ship's head, speed of engines, and the bearings of all vessels in sight, and, also, of prominent headlands if near land. An unimpeachable record would thus be kept of the battle. Afterwards, by combining the observations, it is evident that a chart could be made which would show upon it the tracks of all the vessels engaged, and the actual positions of the vessels at the preconcerted times of exposures. Official reports based upon such a chart would be almost independent of individual opinion, and the chart itself would be above criticism, and obviously of inestimable value to historians.

TEXTURE IN PHOTOGRAPHY.

BY SADAKICHI HARTMANN.



By RENE LE BEGUE.

FOR years our foremost photographers have striven to rival the pictorial qualities of painting, and in recent years one has often had (looking at a print) the opportunity to exclaim, "Why, that looks like a photograph from a painting."

Choice of subject, composition of background and pictures, distribution of space and light and shade were all of such quality that even a painter, who had no belief whatever in artistic photography, was obliged to acknowledge its cleverness. Miss Gertrude Kasebier even went as far as to produce a perfect facsimile of a Holbein drawing by posing an ordinary sitter in the Holbein fashion. But I have never met the "texture" of painting in photographs until I saw Mr. Frank Eugene's work. Many of his prints look like reproductions of paintings in which the brush work was specially bold and dashing, as it is, for instance, in Sargent's portraits. He achieves this peculiar effect either by posing his models with accessories and surroundings as only an artist can, or by furious manipulations on the plate, *i.e.*, by actually painting and etching on the negative with the energy of a Goya.

His "Dogwood" is a sample of the first method; it is not retouched. His "Sisters" and his "Summer" are a combination of both methods. In the case of commonplace subjects,



DOGWOOD. By FRANK EUGENE.

sitters who do not interest him, he takes no pains with the posing, but simply applies the second method. In his "Summer" the entire background, which suggests a landscape, has been painted in by hand, and the effect is really startling. It is not a legitimate photograph, true enough, but the result —the poetic and picturesque quality of the picture—is sufficient to excuse the transgressions, the more so as the laws of artistic photography have as



SUMMER. By FRANK EUGENE.

yet not been defined. The more astonishing still is the "Fairy Tale." Everybody would naturally think it was taken out of doors, but it was taken in the studio. The pool of water, in which the form of the young girl is reflected, is merely a mirror on which a few flower petals have been thrown. This cleverness almost amounts to trickery, but the result again is charming, although it has no decided merit like the majority of his pictures.



PORTRAIT OF SADAKICHI HARTMANN.

Of course, only an artist could apply such a peculiar method of working with profit. A man without artistic training trying to



THE SISTERS. By FRANK EUGENE.



MAN IN ARMOUR.

BY FRANK EUGENE.

work on the same lines would fail absolutely. Frank Eugene, as all who are interested in art know, has been a painter for years before he took up photography. He was principally known to the profession as a painter of histrionic celebrities, having painted Henry Irving, Mrs. Jas. Brown Potter, etc., and Joe Jefferson more than a dozen times, in all his different parts.

He is a man of rare versatility. He etches, makes monotypes, draws in pen and ink and charcoal, paints in oils and water colors, models in clay, plays the guitar and the French horn like a professional musician, performs in amateur theatricals, and is a breeder of dachshunds besides, with a pair of which he is always seen in the streets, and in consequence of which he has become quite a typical figure in the neighborhood around Union Square, in which he lives. That he has lately taken up photography with success does not astonish me in the least. One can expect anything of such a man, and, strange to say, everything he attempts is a new proof of his cleverness, which at times rises to genius.



IN HARVEST TIMES. By GEO. W. NORRIS.

WARM TONES ON GELATINO-CHLORIDE BY DEVELOPMENT.

BY C. C. VEVERS, LEEDS, ENG.



IN the depths of winter, when daylight is scarce and its quality bad or utterly valueless for printing-out processes, the photographer—and particularly he whose time for photographic work is limited—begins to look round for some method of producing his prints at a faster rate than one print per negative per diem, which is about the average at this time of the year. Unfortunately, almost all the rapid printing processes yield only gray or black and white prints, and these are not always suitable for the work in hand.

The method I adopt is simple in the extreme, yet I have no difficulty in producing, in a rapid manner, good prints in tones ranging from reds, through sepias to a rich brown, and which are an excellent substitute for printed-out and gold-toned chloride prints.

I use the ordinary gelatino-chloride papers of commerce (such as "Solio," "P. O. P.," etc.), and print in the usual way to daylight or any intense artificial light, such as electric, oxy-hydrogen, magnesium, acetylene or incandescent gas, until the deepest shadows are faintly visible on the print. I find for this process the "glossy" variety of paper best, it being more amenable to development than the "matt-surface" papers, which contain much less gelatine and appear to be more liable to the fogging action of the developer.

Make a solution of 5 grains of potassium bichromate in a pint of water. The exact weight of the bichromate is very important, as this salt is an important factor in the developer.

To develop, take:

Pyrogallic acid	1 grain
Bichromate solution	6 drops
Water	1 ounce

The developer can be applied by pouring it over the print in a dish, as with a dry plate; but I have, as a rule, found it better to lay the print on a sheet of clean glass, and apply the solution with a soft camel-hair mop or broad "dust" brush. In either case, the print must be dry when the developer is applied; it is not necessary—in fact, it is altogether unadvisable—to remove the free silver by preliminary washing. Detail will immediately begin to appear, and the print will be fully developed in from two to three minutes, when it should be transferred directly to the ordinary fixing bath without any intermediate washing, moving it about, face down, for a few moments. If preferred, an acid fixing bath may be used.

From a negative of standard printing quality, the print thus made will possess a pleasing rich chocolate-brown tone, and after a few minutes' fixation and an hour's thorough washing, can be dried and mounted as usual.



PARIS. By C. S. BAER.

PARABOLOID ILLUMINATION EFFECTS IN PHOTO-MICROGRAPHY.

BY A. CLIFFORD MERCER, M.D., F.R.M.S.



By GEO. C. MEEKER.

DILETTANTE microscopists are familiar with numerous translucent objects which are best seen against a black background, while illuminated with transmitted light. A good showing of this kind is always beautiful, and sometimes as splendid in the microscopic world as is a gorgeous sunset in ordinary experience. Special accessories, however, are required for such exhibitions. Among these is the "paraboloid," of which a description may be found in any complete work upon the microscope.

While an object well illuminated with a paraboloid is to the eye in brilliant contrast with the black background, the same illumination does not give a *clear* result in photomicrography. An excess of light seems to impair the intensity of the blackness of the background in the resulting photomicrograph.

This, for instance, was found to be true in the case of certain moss leaves. A photomicrograph was not satisfactory. Again, the leaves were found to be too thin and translucent, illuminated as opaque objects, to get the desired brilliancy with reflected light. On trial, however, it was found that the paraboloid effect of brilliancy given to translucent objects may be had by: First, obtaining a negative of the leaves illuminated in the ordinary way with transmitted light; secondly, by making from the negative a strong positive on a "transparency" plate; and, thirdly, by printing from the positive strong negative effects on paper.



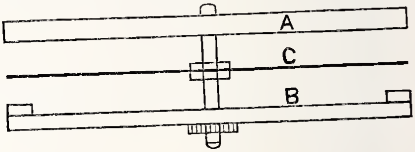
A PHOTO-MICROGRAPH OF MOSS LEAVES. By A. CLIFFORD MERCER.

Illustration is a half-tone reproduction of a negative print on velox paper—of skeleton leaves of a *sphagnum* moss magnified about 40 diameters, or 1,600 times in surface area—obtained in the way described.

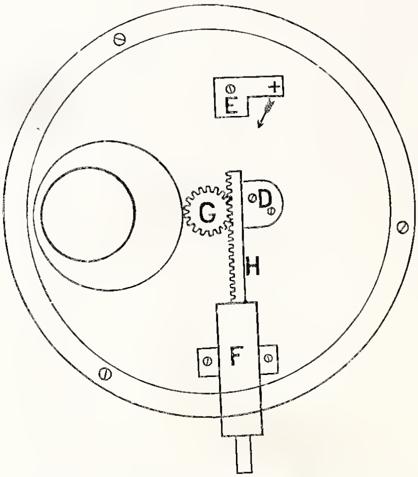
A SIMPLE TIME AND INSTANTANEOUS SHUTTER.

BY ROBERT HUMPHREY.

THE accompanying diagrams, etc., give a description of a shutter which is believed to be preferable to the wing shutters now current. Anyone at all familiar with tools will find it is easily made.



A and B are circular pieces of wood ¼ inch in thickness. One of them must be recessed to receive the rubber disk which revolves between them. Two short pieces of brass tube, or two small washers, must also be attached to serve as metal bearings for the axle.



TWO CIRCLES ARE SHOWN, TO INDICATE THAT THE HOLE MUST BE CUT TO SUIT THE LENS.

C is the revolving disc; a piece of hard rubber $\frac{1}{32}$ inch in diameter; the inner circle of the diagram represents this. A piece of $\frac{3}{16}$ brass rod should be secured to this by means of little washers of brass which are soldered to the rod and then riveted together through the disk. At the upper end of this rod the little pinion is attached.

D is a piece of brass (edge view) ———| needed to guide the rack.

E is the stop which changes the action of the shutter. It is now set for instantaneous exposures. When stop is turned so that the + is downwards it is arranged for time exposures. The end where the + is should be turned up



By C. PUYO

COIN DE FEU

for convenience in turning. The end where the E is should be made to engage with the rack so as to prevent double exposures.

F is a piece of brass tube. Mine is $\frac{7}{16}$ in diameter and 2 inches long. In this another piece of brass tube closed at one end acts as the piston to drive the rack.

Insert a small piece of brass tube in one end of this cylinder to receive the rubber tube.

Bend a piece of brass and solder to the cylinder as a means of screwing it to the wood.

G is the pinion by means of which the disc is driven.

H is the rack which drives the pinion. This is fastened securely in the piston working in the cylinder F.

The size of the shutter can be made to suit the lens. One 5 inches in diameter will give an aperture of 2 inches. It is intended to work on the end of the lens, and will be found about as compact as the wing shutters now in use.



"MATED." By WALTER L. McNAY.

THE INTRODUCTION OF CLOUDS INTO TRANSPARENCIES.

BY LOUIS MELDON.



AT THE EVE OF DAY.
By WALTER BURKE

WHEN you invite your friends to any entertainment, they should be made to feel that no trouble on your part has been spared to make them enjoy what you have provided for them. This first principle is often forgotten in connection with lantern shows at which the small amount of finish necessary in the preparation of the slides makes it too evident to an educated audience that you consider something short of the best quite good enough for them. There is no more essential and at the same time easy mode of adding the best finish to a transparency than by introducing suitable clouds; in fact, many slides which are otherwise worthless become most pleasing when the brilliant white of the sky is shaded by a cloud, and it brings out with much better effect the high lights near to or projecting above the sky line, which are otherwise killed by the harsh brilliancy of an unclouded transparency.

I propose to tersely describe my mode of introducing clouds, which I have not seen used or described elsewhere. If the negative intended for the transparency has an opaque sky, some trouble is saved; if not, it becomes necessary to make a paper print and to cut away with a sharp lance all but the sky portion, and then to gum the sky portion of the print on the sky of your negative (glass side). This is the easiest mode of backing out the sky. The print should not be toned or wet, otherwise it will stretch and be out of register. Now make your transparency in the ordinary way and it will have a clear glass sky.

When this transparency is dry and is found to be of suitable quality, you must on the glass side stick a piece of the ordinary binding strip across the highest part of the

image which is below the lowest part of the sky and back out with water color; paint such parts of the image as are above this strip, whilst the image which is below the strip can be rendered opaque by laying a piece of roughly cut black paper on it when afterwards bringing it into contact with the plate on which the sky is to be printed.

Next you place in your plate-carrier first the prepared transparency, film outwards, then after placing the black paper above described in contact below the lantern strip you put a fresh lantern plate, film side in contact with the transparency. Set up your cloud negative if you are working by reduction, which is best, and make a transparency of the sky through the prepared transparency which you have already placed in front of your fresh plate. Expose and develop, and you have a cloud transparency which will come into exact register on your original transparency and serve as a cover glass.

If you are working by contact the cloud negative goes into the printing-frame in front of the prepared transparency.

When working by reduction the cloud negative should be thrown out of focus, otherwise your perspective will be defective. Your sky transparency should be weak—kept subordinate to the landscape—not so dense as to overwhelm it, unless you mean a storm.

In many cases, where the upper part of the original transparency is dark and without high lights, very little if any paint work need be done, as the deposit itself is enough to shelter the cloud plate from exposure to the sky negative.

This system is, save in exceptional cases, very easy, quick, and most effective; and not expensive, for plates are nearly as cheap as cover glasses.





PORTRAIT STUDY.

BY GEO. W NORRIS.

DR. T. R. ROBINSON'S STEREOSCOPE.

BY HORATIO YEATES.

THE instrument about to be described, though little known, is far in a way the most effective and charming form the stereoscope has yet taken. Instead of looking directly through lenses at the pictures on the slide, an aerial image of the two pictures is formed by a large concave mirror in such a way that there is no effort for the eyes to combine them.

The accompanying photograph and diagrams will clearly show how this is obtained.

(Fig. 1.) The instrument when closed forms a case 13 inches long by 7 inches square (inside measure).

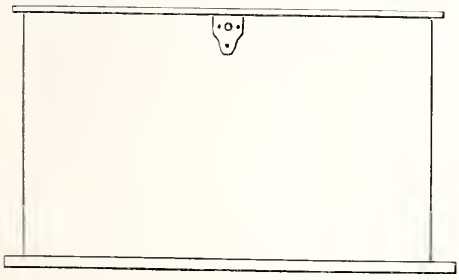


FIG. 1.

(Fig. 2) Shows the optical arrangement. A is where the slide face downwards. C is a right-angled prism with two convex lenses cemented on its front face as shown, the centers of which are a little closer together than the views on the slide, and they form an inverted image on the large concave mirror B at the end of the case, and is viewed by the eyes through the opening E; the top face of the prism is fixed in a line with the top of the case, and D is a milled head by which the part carrying the slide can be raised or lowered so as

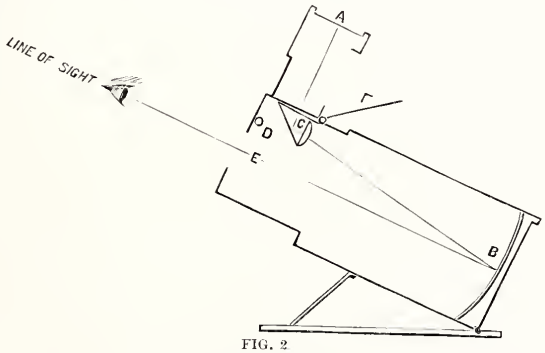


FIG. 2.

to adjust the instrument for distinct vision; finally, F is a mirror for throwing the light up on to the slide.

Particulars: The mirror (B) is 7 inches square and 11 inches focus. The prism (C) about 4 inches long, the sides including right angle 1¾ inches. Focus of lenses, 5 inches and 1¾ inches diameter.

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AN ACETYLENE LAMP FOR PHOTO-MICROGRAPHY.

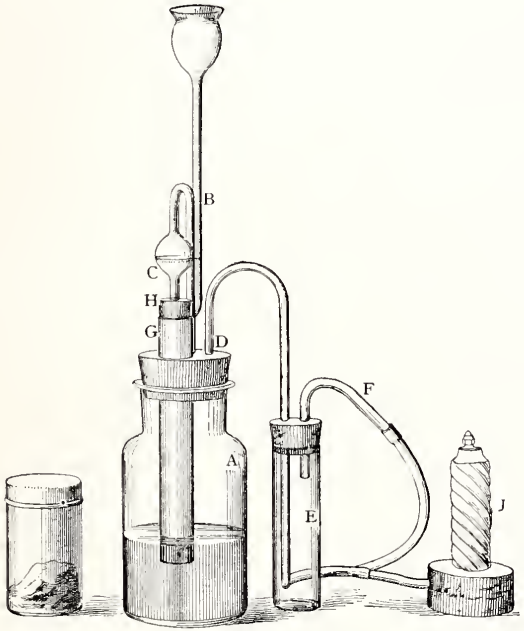
BY ROMYN HITCHCOCK.

The difficulties to be overcome in devising a practical hand-lamp to burn acetylene are so great that if the same conditions had to be fulfilled in a lamp for photomicrography, I would not have undertaken to meet the requirements. A hand-lamp must be compact, it must give a perfectly steady light for a certain number of hours, and it must be convenient to manipulate. For photomicrography the apparatus should be small and convenient, and the light must be approximately steady for a sufficient length of time for focusing and exposure. Moreover, the burner should be independent of the generator, connected by a flexible tube and mounted on a small base, so that the light is in line with the optical axis of the horizontal microscope. In order to utilize the full effect of the light, the flame being very small, it should be brought close to the substage condenser, or to the supplementary condensing lens.

If, therefore, you will recognize that the most I have endeavored to do is to produce a simple lamp for a specific purpose, which will fulfil only the necessary conditions, and which can be made and operated by any one at a trifling cost, I think you will not be disposed to criticise my little device because it is not perfect in other respects.

A few words regarding the value of the acetylene light for photomicrography. As you know, the gas is generated by the action of water upon calcium carbide. The remarkable brightness of the flame of acetylene ensures its extended

use in the near future for general illuminating purposes. Burned under the most favorable conditions, the consumption of five cubic feet per hour gives a light equal to two hundred and forty standard candles. The ordinary five-foot gas burner with common gas may give a light of eighteen candles. The incandescent gas light using gas at the rate of two feet per hour, gives thirty-two candles. In ordinary practice, we may claim thirty-two candle-power from one



ACETYLENE LAMP.

foot of acetylene, although it is capable of yielding forty-eight candle-power. Thus it will be seen that acetylene is an exceedingly valuable illuminating agent.

What we particularly need in photomicrography is actinic effect, and in this regard also acetylene affords an exceptionally powerful light. Mr. C. R. Walker has found that "when equal parts of acetylene and water-gas light, meas-

ured by candle-power, are compared, the acetylene light has two and one-half times the actinic value of the other."

You will observe that the flame of this lamp is quite small and narrow. The intensity of the light is due to what may be termed the density of the flame. The light has remarkable penetrating power. It has been found that in passing through a certain amount of fog the loss of light is only 14.7 per cent. against a loss of 20.8 per cent. for incandescent gas light and 26.2 for the electric arc. What I wish particularly to bring before you is the positive advantage of the small flame. Also, that there is a further advantage in the absence of a chimney to obstruct or absorb light. Light radiates from a point in all directions; therefore, the further the source of light from a condensing lens the less light passes through the lens. This small flame can be brought so close to the condensing lens that the loss by spreading of the rays is reduced to a minimum. A short focus condenser can be used, thus utilizing the light to the best possible advantage.

The apparatus is too small to generate gas for a burner using more than one-quarter of a foot per hour. I am inclined to believe, however, that the flame is quite sufficient for most requirements. There should be a candle-power of about twelve candles in the one-quarter foot flame, as the light will approximate the maximum intensity available from burning acetylene. The special application which I have had in mind is to provide something for those who have not a fixed equipment for photomicrography. Many microscopists have to make special preparations for photography, and the time and bother required to get the lamp in place, to raise or lower it by piling up books or putting it on a special stand so that it will be just right, often deters them from doing the work. With this apparatus the burner can once be adjusted to the proper height, after which it is only necessary to drop in a few pieces of carbide when the final adjustments with the flame can be quickly made. The apparatus is always ready for use, requiring to be cleaned



STATUE OF KING ARTHUR IN THE FRANCISCAN CHURCH AT INNSBRUCK.
BY GEO. W. NORRIS.

out only when the residue has accumulated in considerable amount.

About two years ago or more, in the course of some experimenting in the laboratory of Mr. Wm. Hoskins, in Chicago, the observation was made that the energetic action of water upon calcium carbide could be modified and controlled by substituting for the water a mixture of alcohol and water. Alcohol alone has no action on carbide, hence the proportion of water present with the alcohol can be so nicely adjusted that a practically regular evolution of gas can be obtained with an excess of carbide always present. By this simple means a reasonably steady light can be made with a bottle and a cork provided with a tube drawn out to a jet.

The apparatus which I describe now is based upon this observation, but the device is not quite so simple as that indicated above, for the reason that moisture is liable to condense in the tube, which causes a flickering of the flame and sometimes extinguishes it. Moreover, the cork must be removed to put in more carbide, and some automatic regulator of pressure is advantageous.

The apparatus consists of a wide-mouthed bottle, A, of one pint capacity, provided with a cork (preferably a rubber stopper) with three perforations. Through one of these passes a safety tube B, with a single bulb, in which there is a little water, at C. This water indicates the pressure of the gas, and if the pressure becomes excessive from accidental stoppage of the flow of gas, as by obstruction of the burner or the sharp bending of the rubber tube, the gas escapes through the tube.

Through the other small perforation, D, a glass tube is passed, terminating within the bottle just below the stopper, in a small bulb with a short prolongation of the tube below the bulb, the end being beveled off. The object of this is to allow any water which may tend to accumulate in the tube to drop back into the bottle.

The tube is bent over the stopper and extends downward, passing through a cork almost to the bottom of a specimen

tube, E, the size of which is about four inches by one inch. A second tube, F, affords an exit for the gas through a rubber tube of convenient length.

The object of the specimen tube is to condense any moisture which otherwise might be carried into the rubber tube and to the jet. It is really designed to contain drying and purifying chemicals, but I have not found it necessary to use them.

The third perforation in the large stopper is three-quarters of an inch in diameter. Through this passes a glass tube, G, open at both ends. The lower end extends to within about three-quarters of an inch of the bottom of the bottle, the upper end is immediately above the stopper and is closed by an easily removable cork, H.

The burner, J, is made with two flat corks for a base, a bit of glass tubing and an ordinary gas burner, the tip of which has been removed and an acetylene tip substituted. It is quite practicable to use a glass tip, but it should be made of hard glass and some skill is required in the making. The opening should be about one-fiftieth of an inch in diameter. To join the glass tube to the gas burner common putty was used.

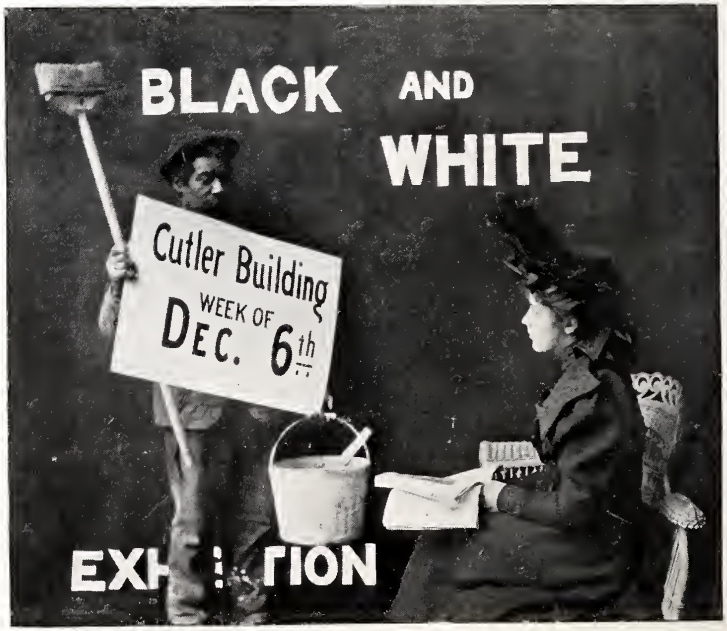
To charge the apparatus the first time, put about six ounces of wood alcohol, or common alcohol, if you prefer, into the generating bottle, pouring it in through the large tube. Then drop in some pieces of carbide through the same tube, sufficient for the immediate requirements, and cause them to distribute over the bottom of the bottle, not immediately beneath the tube. The carbide should be broken into pieces of approximately uniform size, as large as the tube will admit.

Then add, also through the large tube, a little water. The gas immediately begins to come off and the speed of evolution depends upon the quantity of water added. Immediately insert cork, H, and allow the gas to generate long enough to replace all the air in the apparatus. Then light the gas at the tip. If the flame is not large enough, remove the cork and add a little more water. If it is

excessively large, more alcohol is necessary. With a little judgment the correct proportions are easily found.

You will observe that the apparatus continues to generate gas until all the carbide is decomposed. The generation of gas may become insufficient during the continuance of the work in hand. It is then easy to add more carbide through the large tube while the light is burning, but to do this the cork must not be suddenly withdrawn, as the sudden diminution of pressure is likely to extinguish the flame. The pressure of the gas is not likely to be more than half an inch of water when the light is burning at its best, but this depends upon the burner.

When finished with the apparatus, set it aside just as it is. When required again, put in some more carbide and perhaps a little water, and the light is immediately available.



DESIGN FOR A POSTER. By JOHN E. DUMONT.

PHOTOGRAPHING MACHINERY.

BY R. D. O. SMITH.



By SARONY.

A BRANCH of photography which is worthy of more attention than it seems to have received at the hands of those who write about the sun art is the photography of machinery.

I am well aware that photographs of machines are by no means rare, but it is one thing to photograph a machine specially prepared, painted, screened and lighted, and quite another thing to go out into the shop and photograph a machine, just finished and sometimes not yet painted, with only such light as succeeds in filtering through dirty distant windows, past intervening machine tools, with everything around in motion, and with workmen passing and repassing. Under such circumstances, no very artistic effects need be





expected, and the ordinary photographer, accustomed to out-door or skylight conditions, would hardly expect results at all.

The writer is an officer in a company whose shops turn out everything which goes to the power transmission outfit of a mill or grain elevator; that is to say, shafting, hangers, pulleys, clutches, rope transmissions, grain handling devices, etc.

To suit customers, we are constantly producing new things, or new combinations, and for our own information and records, we try to photograph every new or changed construction before it gets to the railroad car. We do not always succeed, because it sometimes happens that the last nut is not tightened up until the thing is on its way to the shipping platform. Frequently the opportunity does not come until the object is on the cars and waiting for the "local freight" to haul it away.

Fate has put upon the writer the duty of doing the most of this photographic work; possibly because of his ability to endure being imposed on. At all events, he has done it to the best of his ability as an amateur without much skill or good luck.

Some years ago, when a new draughting room was fitted

up, a skylight was put in the roof, and things not too heavy are taken there to be photographed, but most subjects are too heavy for that.

When possible, the subjects, whether in the shop or under the skylight, are painted a rather light lead color. That, apparently, gives the best effect. White is too strong on highly lighted parts, and black affords no hope for shadows.

In the shop the only paraphernalia is a big curtain of white cotton for a background, and a ball of twine to hang it with. Long strings of twine are attached to two corners of the sheet and stretched to posts or nails *somewhere* about. The cleanliness of the curtain or the number of its wrinkles are not matters of any importance so long as a view of objects behind is cut off.

While the exposure is going on, if the curtain is kept in motion by waving it, wrinkles and dirty places will be delightfully blended.

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SILVER PRINTING ON PLAIN PAPER.

BY HENRY C. DELERY.



ETUDE. By RENE LE BEGUE.

PLAIN salted paper ranks amongst the oldest printing-out methods, but unfortunately, with the advent of the thousand and one ready-sensitized papers, and the press-the-button amateur who cares for little else than to expose his film, this beautiful process has been almost forgotten.

It is an established fact that the knell of the glossy print has been sounded, which is attested by the work of the leading artist photographers of to-day. Of all the papers now in

use platinum has been found to give the most artistic results; but platinum is expensive, quite beyond the means of the average amateur, and one of its greatest drawbacks is that it does not print out, so that the process of printing cannot be readily judged.

Now, with plain salted paper all these difficulties are overcome, and if carefully done, the finished picture can hardly be distinguished from a genuine platinum. The process is extremely simple and well worth a trial.

The first consideration is the selection of a suitable paper. A well sized and pure white one must be used. Rives or Saxe, preferably the former, will answer well for general purposes, but for broad artistic effects and large work, Steinbach's roll and the different grades of Whatman's papers are excellent. The last being stiff, can be left unmounted, and when printed with a wide margin and given a plate mark, closely resembles a steel engraving. Japanese rice paper can also be used to advantage.

The first step is to prepare the surface of the paper to receive the sensitizing mixture. For this purpose it must be salted—that is, coated with a solution of an alkaline chloride combined with some vehicle which will prevent the solution from sinking into the pores of the paper. In this connection several agents may be employed, principally albumen, gelatine, and starch. The first two, though generally used, are not quite satisfactory and liable to cause trouble, but the latter combined with a little gum arabic gives very good results.

SALTING BATH.

Ammonium chloride	100 grains
Starch	20 grains
Gum arabic	60 grains
Water	10 ounces

Dissolve the gum arabic and the starch and heat solution until it begins to boil, then add the ammonium chloride and filter into tray. The paper may be either floated or immersed in the solution. I strongly recommend the last method, as the solution fills the pores of the paper more



By JOHN BEEBY

FOURTEENTH STREET ON A DULL MORNING

thoroughly, and as it is very difficult to distinguish the coated from the uncoated side of the paper, some very distressing mistakes are liable to occur.

When salting care must be taken to avoid bubbles, and that all parts are evenly soaked, then after three minutes' immersion the paper must be hung up to dry in a closet free from dust.

Regarding the sensitizing bath, I find that a plain solution of 60 grains of nitrate of silver to 1 ounce of water to fill all requirements. Some photographers introduce ammonia into the bath, but I much prefer to leave this agent out and fume the paper to suit the quality of the negative, and the bath can be more easily rectified should it get out of order.

The bath should be slightly acid—that is, should turn blue litmus paper just a trifle red; it should be filtered into a shallow tray, paper floated over it by holding the opposite corners, gently allow the sheet to come in contact with solution, the center first, then the ends, until the whole sheet floats evenly, where it should remain for two minutes, then blotted between two blotters and hung to dry in a dark place.

The solution can also be brushed on the paper by using a wide camel's-hair brush bound in rubber. The paper is first pinned by the four corners to a board and the solution applied. This method is not very reliable; if not carefully done, streaks are liable to occur, and there is considerably more waste of silver than if the floating process is used.

When about to print, the paper must be fumed—that is, hung in a large box with strings across the top, and provided with tight-fitting lid. About ½ ounce of stronger water of ammonia is placed in a vessel at the bottom. The duration of fuming depends on the quality of the negative; dense ones require more fuming than thin ones, as a general rule, ten minutes is amply sufficient.

From fuming-box the paper is ready to print. The printing must be very deep, depending also on the tone desired. For a sepia tone it is not necessary to print as far as for a black tone. The prints must be washed in several changes

of water until all free silver is removed, or until the water in which they are washed remains clear; then tone in

Saturated solution of borax	16 ounces
Chloride of gold	3 grains

The prints are left in this bath until desired tone is reached; if left sufficiently long, a fine steel-gray tone is obtained. But by all means I would advise a second toning in a platinum bath or the combined platinum bath as sold by dealers. This will give a pure white and black tone. Fix the prints for twenty minutes in hypo, 1½ ounces, water, 16 ounces. Then wash as usual.

The finished print will remain flat—there is no danger of curling as with collodion or gelatine papers—and can be either mounted like platinum or left unmounted, and if enough margin is allowed, may be bound in book form to suit the artist's fancy.



ALONG THE THAMES. By CHAS. L. EMANUEL

NIGHT PHOTOGRAPHY IN THE HOME.

BY SPENSLEY CATO.



LAMPLIGHT. Exposure, about 20 min.

PERHAPS there is no word in our tongue which calls forth so many memories, both sweet and sad, as the word *home;* and the more one thinks the more one wonders that photographers should spend so much time in looking for subjects of interest, yet hardly ever think of exposing a plate on their home.

One reason for this may be that many men have but little time while daylight lasts in their homes; but daylight is not essential; and at no time does a house look so home-like as when the lamps are lit and the blinds drawn; and it is the hope of the author that the few hints thrown out in this article will lead to many photographers turning their thoughts and cameras on their homes.

Of late years much attention has been given to photographing streets and other public places at night, and still more attention would have been paid to this branch of our art were it not that the subjects lending themselves to nocturnal photography are comparatively few; and, also, many who would otherwise have taken this work in hand have been deterred by fear of the consequences, arising from standing about in the cold and wet, as is necessary if the best results are desired.

Night photography at home is free from both these drawbacks, to subjects there is no end, and even on the coldest night indoors one is independent of the weather.

In an ANNUAL some years ago there was an article calling attention to the aid which could be obtained from ordinary lamplight in the taking of interiors. The author, however,

advised that all lights should be outside the field of the camera. This, I think, is a mistake, as the whole character of a room is centered round its light.

This inclusion of the lights themselves may appear at first an insurmountable difficulty, but it will be found that so long as the lights have shades or globes which prevent the bare flame from reaching the plate that practically this difficulty is *nil*. All lights should be so placed as to throw as few dense shadows on the foreground as possible. If there is any trouble in focusing the darker details of the picture, a good plan is to place a lighted candle near them and focus its flame.

The exposure varies greatly according to the subject and light. A table laid for the evening meal, with its



A TEA TABLE. Exposure, 17 minutes.

bright silver and white napery, would want a comparatively short exposure, say fifteen minutes, whereas a dark subject might require as much as forty minutes or an hour.

It will be found impossible to do away entirely with halation round the light or lights included on the plate; but this, if the plates be well backed, will be slight, and often adds to the effect.

As to subjects, each home has its own peculiar ones, and in this lies the great charm. Our homes are never hackneyed; to each room and object cling memories which will be forever fresh.

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SOME PHOTOGRAPHS FROM NORWAY.

BY DR. R. W. SHUFELDT.



FIG. 5. OLD HOUSE, GEIRANGER, NORWAY. By PROF. ROBT. COLLETT.

RECENTLY, my distinguished correspondent, Prof. Robert Collett, Professor or Zoology in the University of Christiania, Christiania, Norway, has sent me a series of very beautiful photographs taken by himself during his summer outing in that country in 1898. These fine pictures are interesting from whatever point of view we may be pleased to regard them. In the first place, some of the scenes they represent will be very familiar to American eyes, for Norway has long been a favorite resort for our tourists, especially since its charms have been painted in such glowing colors by the camera and fascinating pen of Mr. Jno. L. Stoddard, in his admirable published lecture upon that part of Scandinavia. Then these results are the work of an eminent naturalist and photographer who has a great many admirers in the United States, not only for the lovely scenes he has given us of his famous land, but likewise for the solid contributions he has made to natural science and to the common stock of human knowledge. For the most part, the conditions of the atmosphere in northern Norway are excellent in so far as the demands of photography are concerned and the success of the artist is involved. The clear effects in the pictures here reproduced fully sustain the truth of this statement.

A pretty result showing water reflection is here reproduced in fig. 1. The chief object of interest in this fine result is the young Norwegian lad sitting bare-back upon the sturdy little pony, as the latter stands nearly breast-deep in the clear water in which the reflections of both are so distinct. A charming feature in this picture is the surrounding ripples caused by the movements of the horse or by the feet of the boy striking the surface at the instant of exposure or very shortly afterward.



FIG. 1. VOSSEVANGER.
By PROF. ROBT COLLETT.

As to these Norwegian horses, Mr. Stoddard has said that a "word of praise must certainly be given to the usual Norwegian steed. Of all the ponies I have ever seen, these of Norway are at once the strongest, prettiest, and most lovable. They are usually of a delicate cream color, with one dark line along the back, the mane being always closely cut. These ponies are employed in Norway almost universally, being not only less expensive but really more enduring than the larger horses. For weeks we drove behind these little animals, till we had tested certainly seventy-five of them, and never once did we observe in any of them the slightest ugliness or a vicious trait. They are, moreover, wonderfully surefooted. I never saw one stumble or go lame. Possibly, later in the season, when much overworked, they may not have the spirit which we found in them; but in our drives of more than two hundred miles, there was not one which did not cheerfully respond to any call." The present writer has examined some lovely Norwegian scenes, painted by distinguished artists of Norway, in which these ponies are shown, and it is his intention to publish them in other connections. They are the property of his wife, who recently received them from friends in Christiania, her birthplace.

A town of special interest in this country is Tromsö, the home of the Lapps. Professor Collett succeeded in getting a fine view of the harbor of Tromsö, and this is here reproduced in fig. 3. The place is a great fishing station, and



FIG. 3. HARBOR OF TROMSÖ. By PROF. ROBT. COLLETT

boasts of a population about 7,000 people, being the capital of the amt of Tromsö and the episcopal see of the same name. It is situated on a more or less flat though fertile island, the town being on its eastern shore. This is likewise known as Tromsö Island, and is located between Hoaloe and the mainland. As in the case of most small places, it has but the one main street with its less important offshoots. The majority of the residences are frame, but nevertheless the place has also a good town hall, Roman Catholic and National churches, and a zoological museum of fair pretensions. Tromsö is a little over a century old, having been founded in 1794. Much has been written about the Laplanders, so we are more or less familiar with them and the rigorous country they inhabit.

Throughout the rural parts of Norway, the camerist finds no difficulty in discovering quaint old structures and



FIG. 4. VIEW FROM TROMSÖ. By PROF. ROBT. COLLETT.

curious old dwellings as admirable subjects to be selected for views. Professor Collett has frequently taken advantage of this feature in his protracted inland rambles. The result of one of these is shown in the extremely interesting picture here reproduced in fig 5. This dilapidated old rookery is evidently the habitation of some not over-thrifty tiller of the soil, for 'neath the spacious eaves of his hut the relics of ancient plows are plainly seen.

Many of the peasants' huts, or even some of the cottages in Norway, are roofed with slabs of stone laid on with great irregularity, though they nevertheless form, when kept in repair, a very effective covering.

Underlying these slabs of stone a thick turf is placed on, and upon this often grows a luxurious crop of grass, sprouting out at the interstices, or thickly over the parts where the stones have not been placed or have slipped away. Many of the romantic Norwegian cottages form pretty subjects for the camera.

THE POWER OF THE CAMERA.

BY CARINE CADBY.



A BUDDING BRANCH.

The power of the camera is now growing to such an enormous extent that there is hardly a subject on which it dares not try its hand. Many workers devote themselves to one particular branch, so that, as in most other interests of the present day, photography has its specialists. Those who live in the country have the chance of using the models Nature puts in their way. In the summer there are the successions of wild and garden flowers for their choice, and in the other seasons there are branches and trails which make up by their beauty of form what they lack in prettiness of bloom, and endless other subjects which an interested and discriminating eye will soon discern. To devote oneself to reproduce the beautiful forms of Nature, as seen in



BY CARINE CADBY.

plant life, certainly is not a small or narrow aim, and one which any wood or common will plentifully supply with subjects. A study of Ruskin's drawings, or Albert Dürer's flower studies, will show the worker that simplicity should be his first aim. Form, not color, must be the goal, for the latter will prove only a snare and disappointment.

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PHOTOGRAPHING CICADAS.

BY DR. R. W. SHUFELDT.



IN THE PHOTOGRAPHIC TIMES ANNUAL for 1899, Mr. George G. Bruce, in an interesting note entitled, "Correct a Mistake," has kindly spoken well of some of my photographic work devoted to various forms of animal life (p. 120). The initial cut to Mr. Bruce's altogether too brief contribution, represents specimens of our common cicada as they appear immediately after leaving their "shells." This is a very interesting zoological cut, and I have heard it well spoken of in not a few quarters, both here and upon the other side of the Atlantic. About the time Mr. Brooks took this picture, I was also engaged in making some photographs of our cicadas, and succeeded pretty well with them. For the first time, I now publish one of this series (see figure), and it will be seen to complete the life history of that part of the existence of the insect to which Mr. Bruce has invited attention.

In other words, it represents a specimen of the common cicada (*c. pruinosa*) as it appears when engaged in the very act of extricating itself from its pupa-skin. This is an interesting phenomenon to watch from beginning to end,

as the writer has done upon several occasions. The feat as accomplished I have published in another connection several years ago, and good accounts of it are to be found in the entomological writings of other authors.

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THE LIMITATIONS OF PHOTOGRAPHY.

BY C. M. GILES.



LAGINA BEACH, CAL. By A. T. COPLEY.

ECCAVI, or, in other words, "me, too." Having myself been a sinner against the proprieties, and having confessed thereto, I can possibly speak with somewhat of freedom a word of caution to others, and especially to the "immatures." Now that the work of the amateur is so urgently sought by "the press" to grace the columns of the "magazine extras," etc., we see many evidences of the fact that the average photographer is ignorant of, or calmly indifferent to, the limitations of the apparatus he manipulates. This is specially true, of course, of the users of hand cameras, for evident reasons. It is an amateur of stronger moral fibre than the average who has never yielded to the insidious temptation to "take a shot" when instinct, reason, and the proprieties all proclaimed that the result would undoubtedly be a "horrible example" of wasted energies and materials. While many a plate or film is prepared for its proper resting place in the waste heap through recklessness or perversity, much of the faulty

work seems to be done through a failure to understand that not only photography as an art, or science, has positive limitations, yet even more so has each piece of apparatus and each method of work, and each brand of plates or paper, and a wise worker will strive to know the limits and keep well within the danger line.

In the matter of the lens, for instance, while some are called "universal," there is no one lens, however well made or expensive, that will do every class of work equally well. Don't try to do telephoto work with a wide-angle lens, or *vice versa*. Don't use an extreme wide-angle lens unless absolutely necessary. Don't use the same stop, or diaphragm, on all kinds of occasions.

In the matter of cameras, while some are made with every known adjustment, no one camera can do all classes and grades of work equally well. Don't try to take elevated objects that require the tilting of the eamera unless you have a swing-back *and use it*. Whenever possible use a tripod camera, study the effect on the ground-glass before deciding on the exposure, and be sure you are right before you go ahead.

Use only the best of materials and use them earefully. For nearly all classes of work the orthochromatic plates are the best; and for interiors, for foliage, and for objects with strong contrasts, non-halation plates arc almost indispensable. Use as slow a plate as the limit of speed will allow; there is more latitude of exposure, less risk in handling, and better average results.

Happy the photographers, amateur or professional, who are not, for financial or other reasons, limited in quality or quantity of apparatus; but such, among the amateurs at least, are the notable minority, while the most are confined to the one camera and its "single eye." That being the case, the capabilities of the lens and camera should be carefully studied, and thoroughly mastered, and work chosen accordingly. If that were the rule, we would see fewer pictures with buildings in which the perpendiculars are too tired to stand erect, the angles playing hide and seek, and other common offenses.



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" . . . . . an iron coast and angry waves,
You seem'd to hear them climb and fall
And roar rock-thwarted under bellowing caves,
Beneath the windy wall.

—TENNYSON.

SOME NOTES ON THE ACTION OF HYDROGEN PEROXIDE ON THE SENSITIVE PLATE.

BY GEORGE D. FIRMIN.



By S. S. S.

A RECENT article by Prof. W. J. Russell, in the *Chemical News*, suggested to me that peroxide of hydrogen was an important factor in many photographic phenomena heretofore not explained or only in an unsatisfactory manner. I was induced to do a little experimental work on the subject, with the result that in following rather closely Prof. Russell's outline, his statements were corroborated in every instance.

That certain bodies can, in the dark, produce an effect upon the photographic plate is well known. The action of certain metals, leaves, some printer's inks, etc., has frequently been shown. It is probable that these bodies have no direct action on the emulsion, but that this action is due to peroxide of hydrogen produced by the oxidation of the metals or other object in contact with air and moisture. It can be shown that both air and moisture are essential to the production of an image. The plate always contains moisture and would likely be inactive if quite dry. The changes in the plate are rendered visible by the ordinary process of development. Quick plates must be used, as many impressions are formed only after long exposure. In my experiments I used Hammer extra fast plates and a metol-hydroquinon developer, as suggested by the Nepera Chemical Company for Velox.

All results produced by metals and organic bodies on

the plate can be reproduced by H_2O_2. The commercial article works as well as pure specimens of same strength.

To test the action of any liquid on the plate a small circular "petri" dish was used, the plate resting on top. The amount of liquid determines the distance between plate and solution. If we use pure water we obtain no image. A trace of H_2O_2 added will produce a darkening of the plate. In my first experiment with a plate over pure water no image was formed inside the dish, but outside the circle of the opening of the vessel there was a decided darkening. The top of the table is of pine, and in this case was wet. Hydrogen peroxide was generated, but could not get inside the dish to affect the center of the plate. The exposure in this case was twenty-two hours (in the dark). One part of H_2O_2 to 1,000,000 of water and exposed eighteen hours produces a faint picture.



Blotting paper, by itself inactive, if wetted with a solution of peroxide 1 H_2O_2 in 500,000 water allowed to dry, and placed in contact with plate for a couple of hours, gives a distinct picture.

Certain metals and organic substances under certain conditions act on the photographic plate. The action of the metals and terpenes is unable to pass through glass, mica, selenite, etc., but passes readily through gelatine, celluloid, gutta-percha, etc. H_2O_2 acts in exactly the same way under the same conditions. They agree perfectly.

Is hydrogen peroxide likely to be present in all the different cases when action on sensitive plate seems? Of tests for H_2O_2 that with titanic acid dissolved in H_2SO_4 is exceedingly delicate. So, also, is the tetra-methyl-paraphenylene-diamine.

The list of active metals (paper of Dr. Wurster) in the order of their activity is magnesium, cadmium, zinc, nickel, aluminium, lead, cobalt, bismuth, tin. These are certainly the metals which in the presence of oxygen would decompose water and form H_2O_2. As a confirmation that H_2O_2 is formed when these metals oxidize, small pieces of test



Copyright 1897, by R. Eickemeyer, Jr.

By R. EICKEMEYER, Jr.

A SQUALLY OUTLOOK

paper were moistened and laid on the bright surfaces of these metals. The intensity of the resulting color was in the order given above.

If the metal is supplied with more moisture, more action takes place. Two pieces of polished zinc were placed in contact with two sensitive plates in two iron boxes. One was kept dry with $CaCl_2$ and absolutely dry air passed through. On developing the plate, no image was formed. Through the other box moist air was allowed to pass. Development showed a decided image.

Metals which are already oxidized do not generate H_2O_2. Neither do they affect the photographic plate. Four strips of magnesium ribbon were arranged in form of a cross. Three were scraped clear of oxide, but the fourth was not cleared. They were then placed on plate and covered with moistened blotting paper. After eighteen hours they were developed. The three bright pieces had made an impression, but the fourth—the oxidized one—had left no mark.

All organic bodies which act belong to the terpenes which, when oxidizing, generate H_2O_2. Ordinary turpentine is very active (moral: keep turpentine away from plate boxes).

Most essential oils (bergamot, peppermint, pine, lemon) are active bodies. All vegetable bodies having a strong smell are capable of acting on plate. Eau de cologne gives good picture. As the action is cumulative, the plate thus becomes a very delicate test for the presence of these bodies.

Mineral oils, as benzine, naphthaline, phenol, aldehyde, etc., do not affect the plate. Also, they are not generators of H_2O_2.

How does the peroxide permeate the gelatine? Not by diffusion, for hydrogen will not diffuse through gelatine. It must be by a process of dissolving or feebly combining with it, and thus traveling through, escape on the other side. A sheet of gelatine was placed over a 2 per cent. solution of hydrogen peroxide, and resting on it a plate allowed to remain twenty minutes. No picture resulted. Immediately on removing this first plate, a second was put

in its place and remained twenty minutes. This gave a faint image. A third under the same treatment was darker, and a fourth still darker. Nos. 5, 6, and 7 were, so far as the eye could judge, of the same density. Thus the amount of peroxide given off from the surface increased for one hour and twenty minutes, then the action became uniform. The same occurs if magnesium be use in placed of H_2O_2.

If a thin sheet of gelatine be laid on a piece of zinc and allowed to remain there a week, on placing above it a sensitive plate, an image will be produced in one-third to one-quarter the time required if previous exposure to zinc had not taken place.

QUICK VERSUS LONG EXPOSURES.

BY GUSTINE L. HURD.



By S. S. S.

WHEN gelatine dry plates supplanted collodion wet plates it was thought that a new power was placed in the hands of the photographer. This proposition need not be denied to-day, but like most other things it is subject to qualifications. The wonderful sensitiveness of the new plate was a boon in many ways, particularly in landscape work, where cloud effects are almost constantly changing and the foliage of trees is set in motion by every passing breeze. In portraiture as well there is a great advantage with many subjects. Young children and groups are no longer a discouragement, and many delicate, nervous ladies, and men of like temperament—all persons with whom cheerful, animated expressions are flitting—can be far more satisfactorily photographed than before. I, in common with many others, had supposed that the advantage of quick exposures was of universal application, but have lately concluded that

there are exceptions. A while back a very old gentleman came in to fulfil an appointment for a sitting. He was a person of considerable consequence and I was naturally desirous of making a success. It was cabinets he was sitting for, and I exposed plate after plate until six or eight had been used, and finally made a 14 x 17 bust figure. When the plates were developed they were all technically good, but none of them approached the large one in the matter of expression. He came in to see proofs and expressed his readiness to order, though I could see that he was not greatly pleased. I suggested a resitting and, when he came in, exposed six or eight plates again with no better success. I showed him a proof of the large one, and he saw by comparison how infinitely better it was, and gave me an order of about seventy dollars' worth of pictures from that plate and smaller sizes reduced from it. Then I began to cast about for the reason why this one, with an exposure six or eight times as long as the smaller ones, resulted in an expression so much better. As I have said, this gentleman was very old and physically and nervously weak, like old people generally, and when an exposure was about to be made I concluded it excited him a little, and the result was that his face was geared up into a kind of frozen expression; while with the prolonged exposure time enough elapsed for the rigidity to soften down, leaving his face to subside into its natural look. This conjecture was confirmed by the same result in various cases since where I had occasion to make large and small work of the same sitter. I think it applies particularly to very old people, or to any one who is physically and nervously weak.

Portrait painters make the claim that whereas a photograph gives but one expression of the subject, they achieve a blending of expressions which far more adequately expresses the person. Many people have quite a gamut of expressions, and when the sitting before the camera is prolonged, it is not unusual for the face to assume several expressions before the exposure is through, thus giving a kind of composite of expression, which is often far better than is attained by a quick exposure.

Perhaps others have noticed the same thing. At any rate, I thought it worthy of mention.



"PATHLESS"

BY A. HORSLEY HINTON.



A DANISH HOUSE. By PH. VON SCHOELLER.

MAGAZINE ILLUSTRATION WORK.

BY ROBERT E. M. BAIN.



GEO. C. MEEKER.

REALLY, it is to be deplored that the public journals of the day cater to the taste for the sensational to the extent of publishing the greater part of their illustrations from the very poorest class of photographic work and consider only the title.

Artistic merit is pushed aside, and pictures are bought from "art dealers" and so-called photographers, for illustrative purposes, that would not be admitted to a "Kodak show."

If the public howls for "Dooie," forthwith the jour-

nals, "yellow" and otherwise, order the "art department" to produce; and they do produce pictures of our Admiral that would give him just cause of action for libel. A cablegram announces some event in the palace at Honolulu, and immediately we have thrust before us pictures of the palace aforesaid that would drive distracted the most mediocre architect; pictures that show the top of the palace to be caving in and in so unstable a condition that the top is one-third narrower than the foundation, and the group of citizens on the top gallery seem to be pitching over to the ground with the front wall. To cap the climax, we always see a group of "natives" staring at the camera and its alleged "artist."

We have handed us with our Sunday morning breakfast, smudges in black and white printed in the locals, under the caption "OUR ART DEPARTMENT," that are intended to represent some "homes of our millionaires," but which represent nothing so much as an upset inkstand or "a nigger hunting a black cat in a coal hole"; and more recently we have silhouettes of human beings, labeled as some specially desperate murderer, burglar, or some well-known army officer or society belle. It is frequently difficult to tell the society belle from the burglar or *vice versa;* and these things we are informed are taken "by our own photographic ARTIST."

Since when became he an artist, and who will vouch for his artistic ability? Surely not the alleged "art department," if it is one in fact. Now, there is no earthly excuse for such work, with the present state of advancement of photography, and to think that the journals doubtless pay as much for this class of work as they would for the best class is aggravating, to say the least of it. Let the journals get into their art department a really good photographer, and there are many to be had, and I feel sure that the difference will be appreciated by a long-suffering public.

When a picture is wanted of some famous place, why not have a *good* picture? It costs no more than a bad one, and it would certainly give us a better standing among nations

who appreciate art than the present standard of illustrative work that we send abroad under the title of "our magnificent half-tones." The kind of work we offer now, for most part, we should be ashamed of.



THE HERMITAGE. By L. W. BARRINGER.

RECENT DISCOVERIES.

BY EDW. LINGAN BOWLUS.



NOW BEG FOR IT.
By FRED. P. RAVEN.

PERFECTION of the two end processes is most essential in the practice of amateur photography. I refer to the preparation of the negative and the permanency of the finished print and in this connection would direct the reader's attention to two articles in the *Scientific American* of February 11 and May 6, 1899.

In the February number mention is made of the use of ammonium persulphate for the correction of over-exposure. This salt has just appeared upon the photographic horizon through the experiments of the Lumière brothers, who find that "its action is to attack only, or at least first, the higher and half lights without touching the weaker deposits in the shadow," such a reaction tending to retard the action of the developer upon the areas so affected and thus preventing the fogging of the negative in case of over-exposure.

The value of this salt in over-exposure must then be quite apparent and its use will undoubtedly be a boon to those amateurs who are accustomed to use a one-solution developer. Almost the same result may be obtained by using a weak and a strong developer whose constituents have been varied to suit the requirements of both over and under-exposure, thus securing an average result. But we should not be content with an "average result"; we should hope and work for the best possible result.

Ammonium persulphate is the complement of various other restrainers now in common use, among which may be mentioned ammonium bromide and potassium bromide. As stated above, ammonium persulphate acts chiefly upon the *high lights* while, on the other hand, potassium bromide is

thought to unite with the undecomposed silver salt which constitutes the deep *shadows* and *half-tones.* In their action upon the exposed plate the one is the complement of the other. Ammonium persulphate has its laurels to win among amateur photographers and needs their careful attention.

A combination of these two species of restrainer seems to give excellent results—any degree of contrast being obtainable. The formula recommended in the article referred to is as follows:

Ammonium persulphate	25 grains.
Ammonium bromide	5 "
Water	1 ounce.

Add a few drops to the developer and watch results. The action of developer becomes less rapid and the contrast greater in proportion to the amount of solution added. The amount, of course, must be determined by experiment.

Unfortunately I have no experience to record other than that the solution is unstable, since I have only reached that stage in which the solution was made and set aside for further use. This solution decomposes almost immediately, becoming after a time amber-colored and giving off the odor of bromine, which it is in all probability.

The second article to which I would draw your attention is that on the "Ozotype, a novel method of carbon printing."

Now having obtained an excellent negative, either by correct exposure or through treatment with ammonium persulphate, we desire to have a permanent record of it and accordingly proceed to print it. Very frequently these prints fade away into the mists of the past and we have neither negative nor print. Our only recourse is to iron, platinum, or carbon printing processes, which are conceded by all to give permanent results.

In the past the technique of carbon printing was quite troublesome and difficult, but recent work along this line has removed many of these difficulties and given us a method whereby carbon printing is more easily done.

The Ozotype or Carbon print is made by exposing to



GIRL FROM THE TUSCAN HILLS.

BY MARIO DEI FIORI.

light under a negative a piece of plain paper coated with a solution of manganous sulphate and potassium bichromate until a distinct brown image is formed. The print is washed thoroughly, and together with a piece of carbon tissue is immersed for a short time in a solution of acetic acid and hydroquinone. The print and carbon tissue are then squeegeed together and hung up to dry. After they are dry, soak in cold water for thirty minutes and then develop in warm water as in ordinary carbon printing.

As an amateur who has profited from sad experience I would advise others to adopt some permanent printing process and recopy all old negatives in good condition, for many of your prints are bound to fade, especially when made with silver and gold by careless and imperfect methods.

A PECULIAR PHOTOGRAPHIC PHENOMENON.

BY CHARLES E. FAIRMAN.



THE NORSE HUNTER'S CALL.
By W. H. WALKER.

SOME two years ago I was greatly exercised over a new and unexplainable defect in the dry plates that I was using, and for some weeks I was driven almost to the point of believing that I was followed by a photographic "hoodoo."

The phenomenon consisted of irregular shaped transparent spots appearing in the negative upon development; these spots varied from the size of large shot to the size of a dime; the centers were entirely transparent, the outer edges were but slightly transparent.

The appearance was that of a plate in which the silver had been entirely eliminated from the portions occupied by the spots.

The first appearance of these spots occurred while using Seed's Non-Halation Plates, and only one plate in the box was affected in this manner. I next found the defect in some Hammer Plates, also in Cramer's Isochromatic Plates.

A perplexing feature of this phenomenon was that only a small proportion of the plates in each box contained these defects, and that it seemed to be common to all makes of plates.

Again the spots were of such different sizes that I was constantly puzzled. One plate would have but few defective spots, and these very small ; another plate from the same box would contain a large number of spots of large size ; and with the fatality that follows photography these spots always appeared on the negatives that I was unusually anxious to preserve.

I finally concluded that the defects were due to some cause affecting the plates after they came into my possession, and after this conclusion devoted some time in searching for the cause.

As a result of my investigations I arrived at the following conclusions :

That the defects were common to all makes of plates that I had used.

That the defects only occurred in the plates used in one particular holder, and in only one side of that holder.

That the number and size of the spots was governed by the length of time the plate remained in the holder, and the length of time increased the number and the size of the spots.

That the defects, therefore, *must* be caused by the plate-holder.

I then made a careful examination of the suspected plate-holder, and found that the slide (a pressed board slide) had been spotted, as though water or some chemical had been dropped on it, leaving slight discolorations on the slide.

As a remedy, I tried covering the exposed parts of the slide on both sides with Post Office paper, and found that

this expedient effectually charmed away the "hoodoo" which had bothered me for some time.

I shall not explain, nor attempt to explain, the chemical reaction which occurred while the plate was in the plate-holder, but suggest that if any of the army of amateurs have met with a similar trouble that the remedy is worth a trial.



AT THE BROOK. By ALFRED STIEGLITZ.



A POSE.

BY NAPOLEON SARONY.

DEVELOPERS AND DEVELOPMENT.

BY C. H. BOTHAMLEY.



By ALFRED STIEGLITZ.

PERHAPS the most striking feature in photography during the last three or four years has been the introduction of a large number of new developing agents, and the attention that has been given by investigators to the various phenomena connected with development. That some of the new developers have no practical advantage over the familiar pyro seems now to be fairly well established. In other cases, whether the results are as good as or better than those obtainable with pyro, depends on circumstances and on the individual point of view, but there can be no doubt that they are distinctly different. Metol, for example, gives negatives of a general character quite different from those obtained with pyro. In other instances, such as the new adurol and the old hydroquinone or quinol, the results are practically the same but the mode of action is different, and the newer substance has some distinct advantages, since it does not require a caustic alkali and, generally speaking, is more rapid in its action.

Just as a painter from time to time extends or alters his palette with a view to a wider range of effects, so a photographer, whether he works for pictorial or technical ends, does wisely to make himself acquainted with all the resources that are available, so that he may be in a position to exert the maximum possible control over his results.

Generally speaking, it may be said that so far as negatives are concerned hydroquinone, pyro, and metol can be made to give distinctly different results and constitute a useful battery for practical purposes. The first gives a short scale of gradation with increased contrasts, the last gives a long scale with reduced contrasts. For example for line subjects hydroquinone is still unsur-

passed, but metol gives photographers fresh power in dealing with very strong contrasts and is also very helpful in cases of very short exposure.

If it is desired to use one and the same developing agent for negatives, bromide prints, and lantern slides, nothing else is quite equal to ortol. Adurol and one or two others have been introduced so recently that it cannot fairly be said that their full capabilities have been ascertained.

The question of the different results obtainable with various modifications of one and the same developer is little if at all inferior in importance to the question of different results with different developing agents, and Hurter and Driffield's lengthy memoir published last year deserves special attention. It is well known that photographers, as the result of accumulated experience, have acquired a belief that they can, by altering the composition of the developer, obtain negatives of different printing qualities with equal exposures. It is believed that by reducing the proportion of the developing agent or increasing the proportion of alkali, the contrasts of the resulting negative can be made less than they would otherwise be and vice versa, and that by increasing the proportion of alkali bromide the contrasts can be materially increased and the effect of over-exposure counteracted.

In their first paper, published some ten years or so ago, Hurter and Driffield stated as the conclusions deducible from their experiments, that the density ratios of a negative are determined by the exposure and cannot be altered by modifying the composition of the developer. Moreover, they remain constant at all stages during the progress of development. These conclusions were quite contrary to the general belief and they were naturally subjected to severe criticism.

In the recent paper, however, Hurter and Driffield admit that the density ratios are not constant if the composition of the developer is varied sufficiently and they show that an increase of the developing agent (pyro) or of bromide increases the contrasts or vice versa, whilst an



By SCHLOSS

PORTRAIT

increase of alkali tends, though in a less marked degree, to reduce the contrasts or vice versa.

This substantially brings us back to the original position and leaves us with the old beliefs strengthened rather than otherwise. At the same time it is clear from the experiments of Cadett that to secure the maximum possible effect of variations in the composition of the developer, these variations must be made before the developer is poured on the plate.

Experiments that I have made by methods differing somewhat from those of Hurter & Driffield, but imitating as far as possible the ordinary working conditions lead to practically the same results and confirm the general belief as to the effects of changes in the composition of the developer.

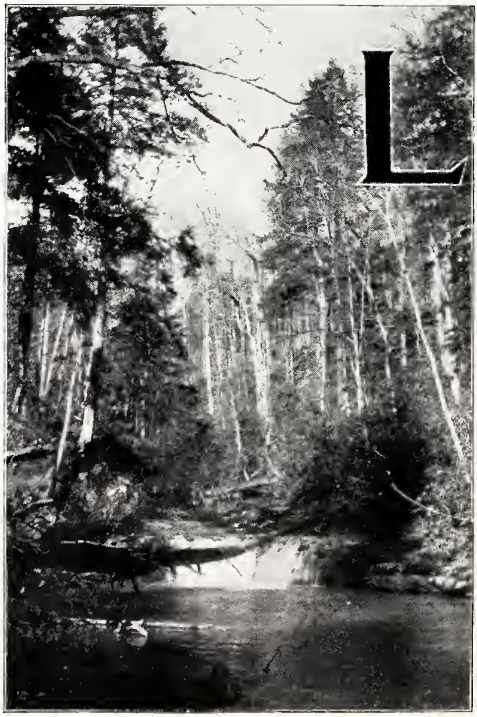
The control that the photographer can exercise over the character of the negative obtainable on a given plate with a given exposure lies, therefore, in the first place, in the selection of the developing agent (e. g., pyro or metol), and in the second place, in modifying the proportions of the constituents of the developer. Whether the effects of these variations admit of numerical expression that has any real practical significance is certainly doubtful, especially having regard to the uncertainty introduced by the variations.

There are some photographers who delight in asserting that they do not concern themselves with the peculiarities of different developers, or the effects of altering the composition of the developer, but if their negative is unsuccessful they expose another plate. Now it is difficult in the first place to understand why any one should take credit to themselves for want of knowledge of the properties and capabilities of substances and processes that they are constantly using ; no one hears an eminent painter brag of his ignorance of the peculiarities of his brushes or of his pigments, alone or mixed. Secondly, there are very many cases where a second exposure is out of the question—so many that it is unnecessary to quote examples—and, if the photographer wishes to keep failure at a distance, he must

be well acquainted with the possibilities of his developer as well as of his plate. Whilst the general principles already enunciated may not admit of numerical expression, or of reduction to a formula, they do afford a sound basis on which the watchful and observant practical photographer can (and does) rest his practice under varying and difficult conditions.

EXPERIMENTS OF LUMIÈRE AND SEYEWETZ ON SOME NEW AND COMPLEX DEVELOPERS.

BY A. B. AUBERT.



ON KEENEY'S CREEK, Fayette Co., W. Va. By FRED. R. RAVEN.

LUMIÈRE and Seyewetz have lately made a number of experiments upon the developing power of new compounds prepared by them. A brief description of these may be of interest to the readers of the ANNUAL.

Combination of aromatic monamines and phenolic developers.

$$C_6H_4 \begin{matrix} /OH, C_6H_5NH_2 \\ \backslash OH, C_6H_5NH_2 \end{matrix}$$

Compound of hydroquinone and aniline.

$$C_6H_4 \begin{matrix} /OH, C_7H_7NH_2 \\ \backslash OH, C_7H_7NH_2 \end{matrix}$$

Compound of hydroquinone and pratoluidine.

These are crystalline bodies soluble in weak alcohol, which solution will not develop alone or when mixed with sodic sulphite. The addition of an alkali brings out their developing power, partially decomposing the compounds into hydroquinone and the amine, the results being similar to those obtained by the use of hydroquinone alone.

The compounds of pyridic bases with phenolic developers, as, for example, the compound of hydroquinone and quinolein,

$$C_6H_4\begin{matrix}/OH, C_9H_7N\\ \backslash OH, C_9H_7N\end{matrix}$$

yielded results similar to those obtained with the above compounds of amines and a phenolic developer. Compounds of aromatic diamines and monatomic phenols, as:

$$C_6H_4\begin{matrix}/NH_2, C_6H_5OH\\ \backslash NH_2, C_6H_5OH\end{matrix}$$

Phenyldiamine and phenol (carbolic acid). The solution in dilute alcohol acts as a weak developer. The addition of an alkali renders these compounds soluble in water and the solution acts as a developer, giving results quite the same as those obtained by the use of phenylene-diamine alone, the compounds being partially decomposed by the alkali.

A large number of compounds of aromatic diamines and diatomic phenols were prepared, and in these cases the substances alone either exhibited no or only weak developing power, which was greatly increased by the addition of an alkali, the compound being evidently decomposed under its influence. Aromatic diamines and triatomic phenols gave results quite similar to the corresponding compounds containing diatomic phenols.

The Messrs. Lumière and Seyewetz contributed an article to the *Bulletin de la Société française de Photographie*, November, 1898, in which they describe the results of a series of experiments upon compounds of the fatty amines and phenolic developers, such as hydroquinone. They have proved in these experiments that the compounds thus produced may be used as developers without the addition of an alkali, the fatty amine evidently acting as such.

In a general way, the results of these experiments may be summed up as follows:

The fatty amines combined with phenols possessing the developing power produce substances which may be used as developers without the addition of an alkali.

The compounds of aromatic monamines or pyridine bases with phenols produce bodies whose solution does not develop without the addition of an alkali; the same is true of compounds containing the developing phenols combined with non-developing diamines, while the compounds of developing phenols with developing diamines act as weak developers, which are of no practical value unless an alkali or an alkaline sulphite be added.

The compounds prepared for these experiments are what are called comolecular combinations, which are usually loosely held together so that the addition of alkali partially decomposes them, setting free the developing phenols and amines which now yield results similar to their alkaline solutions, many of which are well known to photographers.



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GREAT EXPECTATIONS. By JOHN E. DUMONT



RAIN FROM THE SEA.

BY A. HORSLEY HINTON.

THE EFFECTS OF COUNTER-LIGHTING.

BY G. VIEUILLE.



"WHO GOES THERE?"
By W. BURKE.

GENERALLY speaking, the photographer adhered to the rule of directing his apparatus towards the object to be photographed only when the light was falling on this object at a certain angle either from the right or the left, and he never would have dared to place himself just before the sun in order to obtain those magnificent effects often produced by such a lighting, for the reason that it was almost impossible to avoid that effect resulting from the diffusion of light known under the name of halation, which occurs whenever the subject to photograph presents great contrast of



By G. VIEUILLE.

lights and shadows, as, for example, a tree standing out on a clear sky, a window in a room, etc.

However, by a very short exposure, it is not impossible

to avoid the defect in question; but, practically, it is often useful, on account of the effects to be obtained, or by reason of deficiency in the lighting of certain parts of the subject, to lengthen the exposure-time for a few seconds; and even for interiors, during several minutes, it becomes necessary to find a more certain means to prevent the rays of light from being reflected back on themselves, and thus produce the effects of halo, after having run through the sensitive film.

To that end several methods have been proposed; some manufacturers have prepared the plates with two gelatine



By G. VIEUILLE.

films, one of them—that in immediate contact with the glass plate—colored with a substance absorbing the rays of light. But since these plates are necessarily dearer than the others and, besides, somewhat complicate the operations, one often prefers to employ the preparations he is accustomed to work with, and it is for this reason that some operators find it more economical, and also less complicated, to cover the back of the plate, those ordinarily employed, with a compound which can be easily prepared.

Several formulas have been published for the preparation of an anti-halo coating. From a comparative study made by one of my colleagues in the *Société Française de Photographie*, the experimenter, Mr. Gravier, finds that there is little difference, in regard to the effect produced, between the various preparations actually recognized and for sale on the continent. However, after having discovered that the tissues or black papers placed behind the plate do not at all prevent the halo by reflexion, the only one it is possible to avoid, he recommends the use of a coating consisting of a solution of gum arabic and of the caramel of commerce, whose preparation is exceedingly simple. Make a brown syrup, and gradually add to it from 5 to 7 per cent. of alcohol; then keep this compound in a vial. For use, it suffices to pour a few drops of it on the back of the plate and to spread it in a thin and regular coating, which should immediately be covered with a sheet of black paper. Before developing, the paper is removed by wetting it and the coating washed off with a damp sponge.



By G. VIEUILLE.

We find in commerce several siccative preparations answering the above conditions; but whatever is employed, the process is always very simple, and there is certainly no excuse for not using it.

The use of the anti-halo is also imperative when we photograph subjects having great contrasts, even when the



By G. VIEUILLE.

lighting is normal, as, for example, a white statue on a black background, etc., or when one makes diapositives for projection; besides thus obtaining an image of greater clearness, we can also correct to a greater extent any excess of exposure. But it is specially from an artistic point of view that one should judge the results, which in any case largely compensate for the extra trouble we have taken.

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"DON'T."

BY H. H. WILLIAMS.

This was just what I thought the other day when, as going down to the C. & O. depot, I saw a friend posing his two brothers flat against a wall with sun full in their eyes and right at his back (it was about two o'clock) so that he might Kodak them. When he had finished I fell into conversation with him and tried to show him where "snapshots" came in. I pointed him out two little niggers across the road sitting eating some fruit, and just below, the bag-

gage carts and people waiting for a train. He looked quite surprised; it had never dawned on him that things like that were worth taking at all. He crosses that R. R. at this point at least six times a day, and had never once noticed the comical things one often sees in a depot.

Now my friend is only one of a great army who *don't* use their eyes. It is not that they "won't," but that they have never realized they are *not* doing it, and it had never dawned on him that he could not by any possibility, get any satisfaction out of the "picture" (?) he was trying to make. What could he expect of two boys, one long, one short, flat against a brick wall, and blinking like owls in the hot sun? Reader, have you ever done "pictures" like that? Then DON'T do it again. A friend asked me the other day why one sees so few pictures of the comical side of life. Now this has often puzzled me. Is it that we of the Anglo-Saxon race have no sense of humor? I hardly think so. Here again I fancy the fault is we DON'T use our eyes. I did wish for my camera the day I saw the incident mentioned at the beginning of the article, that was for sure a comical picture; those two boys against the wall were so *very* careful of their attitudes, and the way the big brother pranced up and down in front of them with his minute Kodak looking for the "best" point of view was very fine. One word of warning about "funny" pictures; DON'T try to arrange one unless you are a very skilled artist indeed, or you will meet with the most dismal failure of your life.

The best snap-shots can be had where children congregate, and where they are accustomed to seeing you pass by. The seashore gives some of the most pleasing that one can possibly wish for. Here you can use slow plates and stop down your lens to, say *f*/16, this with Carbutt's B/16 and shutter working at, say $\frac{1}{10}$ sec., will give results worthy of being reproduced in the Almanac.

DON'T expect to get artistic "snap-shots" when you carry a gorgeous Morocco-leather-covered-brilliant-nickel-mounted box that proclaims your quest to the four winds of heaven. I find, after some 15 years' experience, that plain

unpainted wood and dull metal, is by far the best for the outside covering. When this mania first started, more as a joke than anything else, I put my 3¼ x 4¼ camera and lens into an empty flower seed box, put a few loops inside to hold the carriers, and at an expenditure of ten cents for lock and hinges, I had really a detective camera that has done me splendid work. I left the address label on the lid and found that "Sutton & Sons, Seedsmen to Her Majesty" was the best preventive of people knowing what the box really was, that I could possibly have gotten.

One thing more, a hint which might be useful in changing plates away from home; take four or five deep yellow sheets of tissue paper and one red, lay these out flat and paste the edges together, then form a cylinder and fasten the edges. You will then have a tube that will surround any small lamp or lantern, and be, with ordinary care quite safe for any but the most rapid plates. You can if you wish use more red paper, but I have found four yellow and one red, sufficient.

When using it with a lamp I put a chair or stool over to prevent the light reflecting from the ceiling. Don't use this with a naked candle or you may have a flare up.



ALONG THE SEINE. By E. MAINWARING.

PHOTOGRAPHY IN A MURDER TRIAL.

Its Use in the Case of Dr. Samuel J. Kennedy, Convicted of Murdering Dolly Reynolds.

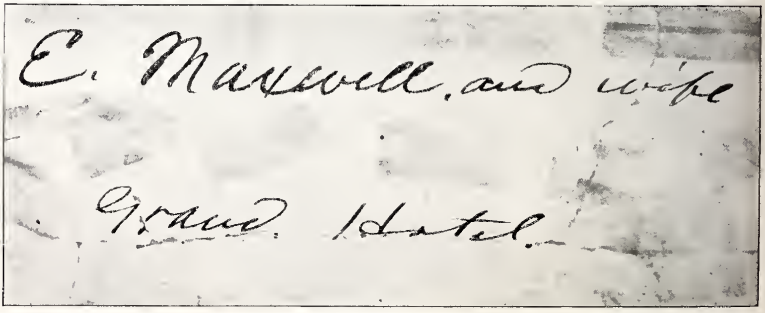
BY WILLIAM J. KINSLEY.

(EDITOR OF *The Penman's Art Journal*, New York, and the Principal Handwriting Expert in the Case.)

IN the last quarter of a century the identification of individuals by means of their handwriting has been used more and more in criminal as well as civil cases in the courts. Through the handwriting of the individual will shine his personality as in no other thing he does. It is more personal oftentimes that the person himself, as frequently—in fact, nearly always—there is less change in the handwriting from year to year than in the features of the individual. And where changes in handwriting do occur, the characteristics remain.

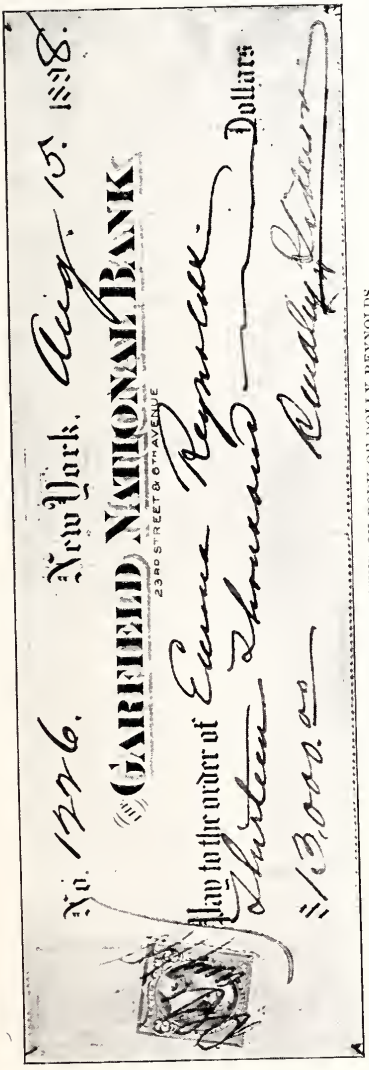
D'Israeli has said: "To every individual nature has given a distinct sort of writing, and she has given him a peculiar countenance, voice as manners."

A man's personality is mirrored in his writing as it is not even in his photograph. His writing—if it be his normal hand—represents his natural self, and nearly all portrait photographs lack truthfulness and individuality. Given two pieces of natural writing, written at two different times, and the identity of the writers can be settled with a greater degree of certainty than by comparison of two photographs, or of photographs with the original.



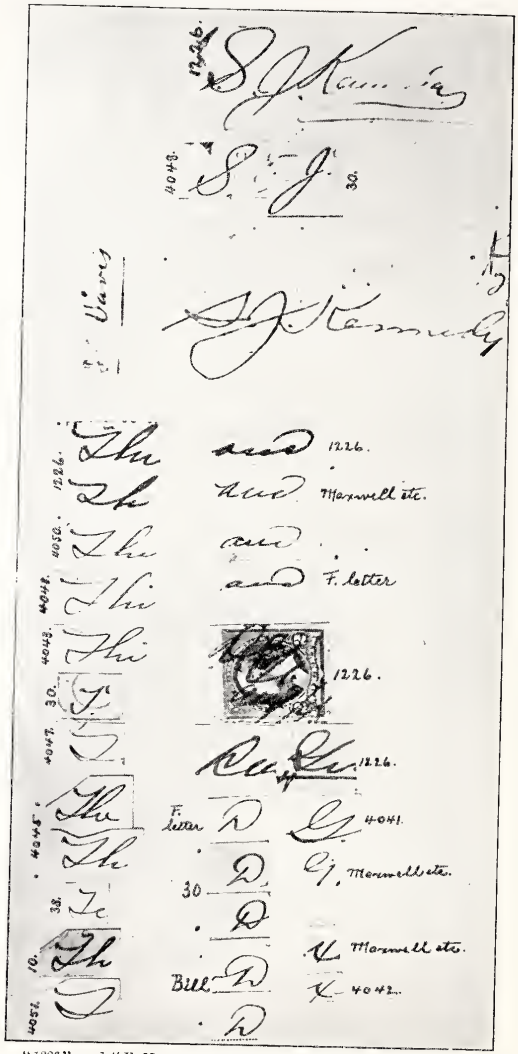
Pasted from scraps found in waste basket in room of Dolly Reynolds in Grand Hotel. Slip was torn from advertising pad.

J. Crépieux-Janin, the French graphologist, says that : "Handwriting is a gesture of the mind." This I believe to be true. At the beginning the gestures and the handwriting were both more or less formal and studied, but as time passed and countless repetitions occurred, the writing became like speech and gesture merely a reflex action executed almost wholly without thought. In writing a letter we are concerned with the thoughts we are trying to express, and not, as a rule, with the handwriting. It is in this natural, wholly unstudied writing that a person's characteristics are plainest shown, and those are the specimens sought for by the expert when called upon to make a comparison



THE BOGUS CHECK FOUND ON BODY OF POLLY REYNOLDS.

In school and early life we try to acquire a more or less model hand and strive for a certain ideal. The exigencies of business in later life modify this ideal hand until it fits itself into our life in such a way as to serve our purpose by recording our thoughts, stamping our personality on it, and to a greater or less extent reflecting our character. (Many people mix character and characteristics. By the first I mean traits of character in the individual;



"1226" and "E. Maxwell" designate the disputed writing. All other is admitted writing of Dr. Kennedy.

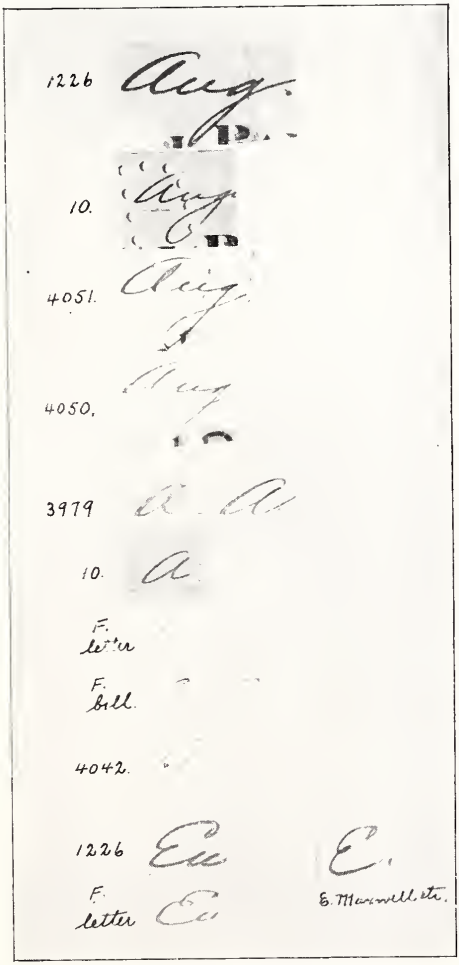
by the second, peculiar and personal identifying marks in the handwriting that establish the identity of the writer).

When we attempt to disguise our writing we face the following propositions: 1. We must know all of the characteristic of our handwriting. 2. We must be able to eliminate them at will. If we wish to simulate the handwriting of another person we have the added propositions: 1. We must know all of the characteristics entering into this writing. 2. We must be able to acquire those characteristics at will. I do not believe there is an individual who lives who knows and can successfully do these things. And but few people even know the characteristics of their own handwritings.

So much for the handwriting. Now as to the part photography plays when harnessed with expert handwriting. By means of photography the handwriting expert is able to have duplicates made of all exhibits in the case so that court, jury and the attorneys may follow the explanations. By enlargements signatures, words and letters, and quality of lines may be shown so that jury may see from their seats. The enlargements are practically a permanent microscope applied to the writings. For all practical purposes good photographs are as good as the originals, and having these duplicates is a safeguard against loss. If any changes occur in the originals after they have been photographed the photographs are of great value in showing it.

A great case in which photography aided expert handwriting in playing a leading part, was the noted trial in New York, of Dr. Samuel J. Kennedy for the murder of Dolly Reynolds.

Miss Reynolds was found murdered in a



"1226" and "Maxwell" refer to Bogus Check and "E. Maxwell" note the disputed writing. All other is the standard writing of Dr. Kennedy.

room in the Grand Hotel on August 16th, 1898. Some torn scraps of paper were found in the waste basket and some on the fire escape leading from the window of the room, by that lynx-eyedchief of detectives, Captain George McClusky. When the pieces were put together they read "E. Maxwell and wife, Grand Hotel." On the body of the murdered woman was found a check for $13,000; maker's name, Dudley Gideon. The check was endorsed "S. J. Kennedy." When the detectives took the check to the Garfield National Bank, on which it was drawn, the bank told them that no such person as "Dudley Gideon" had an account there, but that Dr. Sam'l J. Kennedy did. In looking up Dr. Sam'l J. Kennedy they found he was a dentist on Sixth Avenue. He was promptly arrested and admitted knowing the murdered woman but only in a professional way. His handwriting was compared with that on the face of the check and the endorsement and was found to be the same. A comparison of the handwriting also established the fact that he wrote the slip "E. Maxwell and wife, Grand Hotel." On the reverse of this slip was printed the name of "Phillip's Milk of Magnesia, a proprietary article prescribed by dentists and doctors. The slip was evidently torn from an advertising pad. On Dr. Kennedy's desk in his office was found a similar pad. Various clerks and employees of the hotel identified Dr. Kennedy as the man who passed as "E. Maxwell" at the hotel.

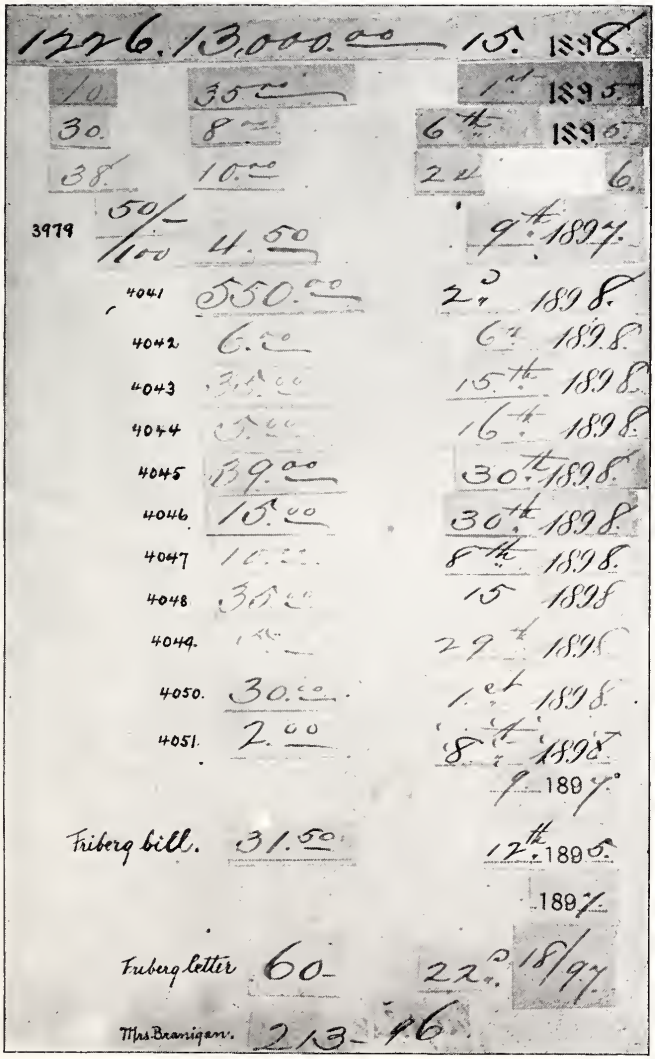
The woman was killed by blows struck with a blunt instrument. A bludgeon found on the premises, which was made by running an iron rod through a lead pipe, was undoubtedly the instrument used. A search in the workshop cellar at Dr. Kennedy's residence brought to light similar rod and pipe. He could not account for his whereabouts on the night in question.

The motive for the crime is supposed to have been to obtain possession of the bogus $13,000 check, No. 1226. Miss Reynolds drew from the bank $500 to bet on horse racing. The supposition is that Dr. Kennedy was to invest it for her, and the $13,000 check was her share of the



By SCHLOSS

PORTRAIT



FIRST OF FIGURES IS FROM BOGUS CHECK. ALL BELOW THAT ARE FROM ADMITTED WRITINGS OF DR. KENNEDY.

profits (?) on the $500 investment! And the further supposition is that she requested him to endorse the check, and that he in thinking this over afterwards decided that it was a mistake to have so endorsed it. The detective theory is that he went back to secure the check and was obliged to kill the woman to get it, and after all did not get it as she had secreted it on her person.

Detective Sergeant Arthur Carey, who was put in charge of the case by Captain McClusky, handled the matter with intelligence and skill.

The handwriting part of the case was worked up and the material prepared for the photographer by the writer, and he was ably assisted at the trial by Messrs. Daniel T. Ames and W. E. Hagan.

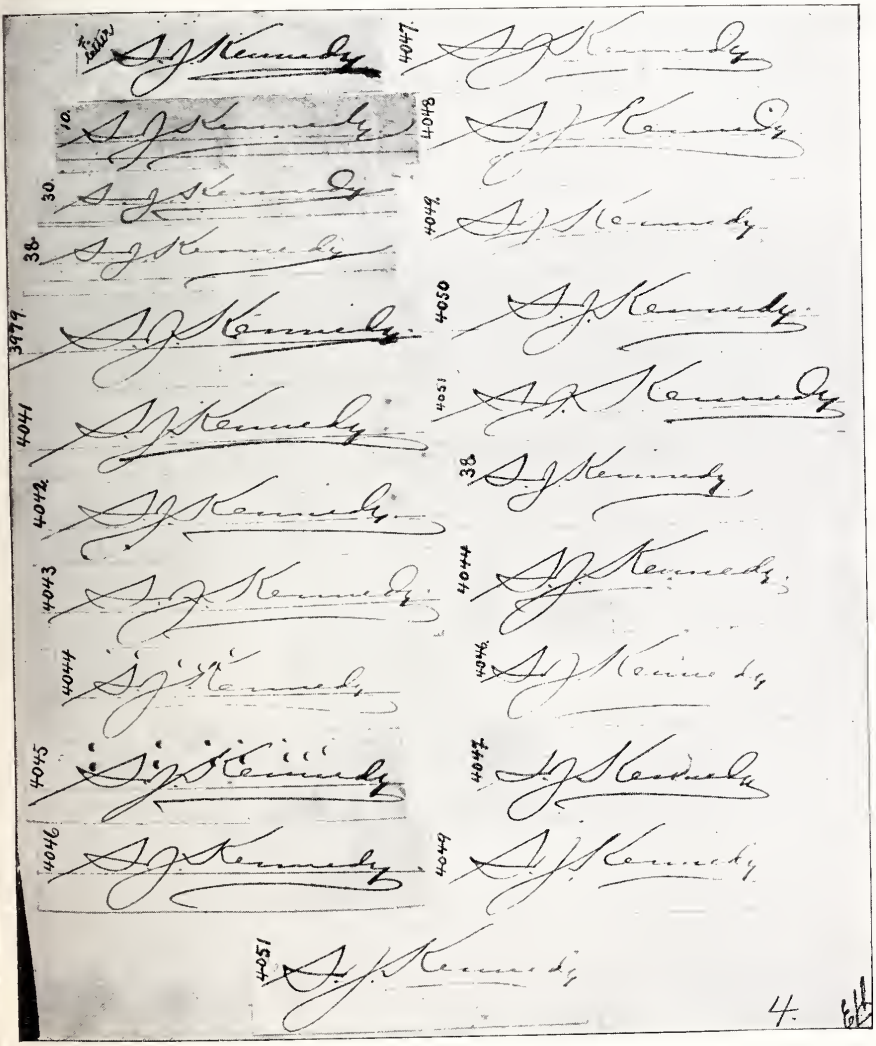
The various exhibits of disputed writing were arranged, and compared with the same letters, words and combinations found in the standards, or admitted writing of Dr. Kennedy.

Photographs were made of all the exhibits in the case, and letters, words and figures clipped from those photographs were pasted upon cardboard, and other photographs made of these "assembled" or pasted photographs. In this way the various characteristics in the disputed to be compared were brought in close proximity to those in the standards and could be more easily studied. From these photographs half-tone cuts have been made and they are shown herewith.

Ernest J. Lederle, Ph. D., City Chemist for New York City and an expert photographer, made the very handsome photographs from the originals and also all of the enlargements used.

The disputed writing is on the check number 1226, and the "E. Maxwell" note (which was assembled from torn scraps and the photograph shows the scraps and the pasting). All of the other writing is the standard writing of Dr. Kennedy.

While the handwriting played a prominent part in the case, yet the identifications by hotel employees, the finding



STANDARD SIGNATURES OF DR. KENNEDY.

of the pad, lead pipe and iron bar furnished strong corroborative evidence, and all coupled with the defendant's inability to account for his whereabouts on the night in question, made a clear case in the minds of the jury.

This is but one of the many cases in which photography has been of great service to the writer and to the cause of justice.



AN ANXIOUS MOMENT. By W. M. H.



STRASBURG CATHEDRAL.

A REMARKABLE FLASHLIGHT PICTURE. (*See Novelties of the Year.*)

HOW A LENS IS MADE.

Among the manufacturers of photographic articles very few have made such rapid strides as the optical institute of C. P. Goerz. This concern, which was founded in 1888 as a small shop with three workmen, nowadays is one of the largest factories in the world for the construction of photographic objectives.

As early as during the second year of its existence the



FIG. 1.

institute brought out a novelty, the "lynkeioscope," based on Moser's calculations, an aplanatic lens of considerable luminosity. In 1892 the number of workmen employed was seventy. A rapid increase in business followed the introduction upon the market in 1893 of the double anastigmat,

constructed according to the calculations of Herr v. Höegh, the scientific assistant of the firm. The output increased so tremendously that the shops had to be transferred into a large factory building. At the same time a branch factory was founded in Winterstein (Thuringia), to assist the main lens-grinding works, and offices were opened in New York and Paris to further the interests of the constantly increasing export trade. Moreover, a license to work under the British double anastigmat patent was granted to the firm of Ross in London, and similarly a license under the Austrian patent was given to the firm of Karl Fritsch, formerly Prokesch.



FIG 2.

When in 1896 the number of workmen employed in the main factory rose to three hundred and fifty, the construction of a separate large building became imperative. The result was the factory at 43 to 50 Rheinstrasse, Friedenau, near Berlin, designed for a force of seven hundred workmen (see Fig. 1) This huge five-story structure, decorated at the top with a statue representing Optics (a work of the sculptor Heider), was occupied in March, 1898. Within a year the addition of an extension has become necessary.



FIG. 3.

We will now follow the manufacture of an objective in its different stages. The glass is obtained in blocks (Fig. 2), which should be of the very best quality—that is, as transparent and colorless as possible, and free from spots and strains. The optical constants of the glass having been

ascertained, the blocks are cut into pieces or slabs of predetermined thickness and length by means of galvanized iron disks the cutting edges of which are set with diamonds (Fig. 3). The corners are broken away by means of flat

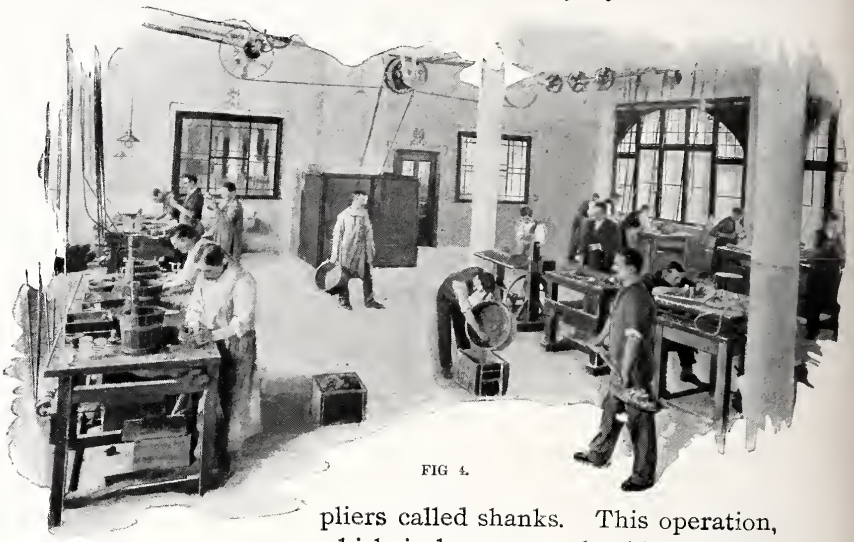


FIG 4.

pliers called shanks. This operation, which is known as shanking or nibbling, gives the blank a rough approximation to the circular form of the lens, producing a smooth, low cylinder, the height of which is about equal to the intended thickness of the lens. This being done, the lens is ready to be ground.

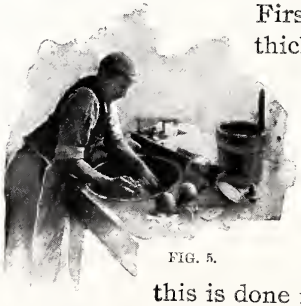


FIG. 5.

First, to reduce the blank to the exact thickness required, the excess of glass is removed by grinding with wet sand on rotating plane cast-iron disks. Then the edge is smoothed with disks having recesses of corresponding shape. Upon this follows the rough working of the curved surfaces, or rough grinding, as it is termed. All this is done in the rough grinding room shown in Fig. 4. The workman holds the glass with both hands and presses it against the rapidly rotating grinding shell (Fig. 5),

which is covered with wet grinding sand, taking good care to have the grinding action continue uniformly over the entire surface of the lens. The cast-iron grinding shells (see Fig. 6 in the foreground) are either concave or convex, according to the shape of the lens to be produced; the quality of the lens depends upon the exactness of the shape of the grinding surface; for this reason the shells are often examined during their use and discarded as soon as they are found to be inaccurate. A skilful grinder can by exerting pressure uniformly preserve the shell in proper shape until it is worn. This, with lenses of medium size, will not occur until about one hundred lenses have been ground.

During the rough grinding the lens is from time to time tested with the template and with the calipers. The templates or gauges are brass disks with circular openings of the same degree of curvature as the lenses, but the curvature is in the opposite direction. The workman places the template vertically on the lens and ascertains if the edge of the template opening touches the lens at all points simultaneously. The calipers (shown at the right-hand side of Fig. 6), consist of two aligning rods which may be moved toward and from each other. The thickest or the thinnest part of the lens to be measured is brought between the rods, and the distance between the ends of the points is then indicated within one-twentieth of a millimeter.



FIG. 6.

The lens having been rough-ground and thus brought to its approximate shape and thickness, there follows the final grinding operation, namely, the truing or figuring, and the polishing. Figure 7 represents one of the large grinding rooms of Goerz's factory, in which this work is done. The figuring is carried out with shells like those

used for rough grinding, but the machines or "mills," as they are called, are arranged to be driven by pedals, for the reason that with this arrangement a greater exactness



FIG. 7.

of work is possible (Fig. 8).

Figuring requires a degree of accuracy of which the uninitiated has no adequate conception; mechanical measuring instruments are not sufficient to afford the required test, and the manufacturer resorts to the observation of a physical phenomenon—Newton's interference rings. In order to be able to press the lens evenly upon the rotary grinding shell, the workman fastens the lens to a handle by means of sealing wax. In Fig. 6 several such handles with lenses attached are represented. If the lenses are small, several of them may be secured to a common holder (see Fig. 6, at the center). Figuring is done exclusively with wet emery progressively finer as the lens nears completion, the finest emery serving to give the lens surface its final mathematic-



FIG. 8.



FIG. 9.

ally correct shape. During the several stages of figuring, a most careful supervision is effected by means of testing glasses (see at the right in the foreground, Fig. 2), and of the spherometer. When the lens is pressed upon the testing glass, Newton's interference rings are observed, and their color, location, and regularity or irregularity indicates any departure from the correct surface. This test will reveal clearly the existence of an error as small as one ten-thousandth of a millimeter.

Finally, the lens is polished with rouge upon an automatic polishing mill (Fig. 9). The workman covers the polishing shell with pitch and moulds it by pressing the lens into it. Then the polishing powder is applied and the shell is rotated. This operation is also constantly watched by the aid of the test glass. The average time required for polishing a lens of 5 centimeters diameter is *one day*. The finished lenses are again measured with the spherometer (Fig. 10), and at the same time examined as to flaws in the glass. Small air bubbles are not detrimental, but lenses with spots or strains (causing irregular refraction) are discarded. The percentage of rejected lenses, or waste, is quite considerable; lack of skill on the part of the workmen also often causes the spoiling of valuable lenses, and all this increases the cost materially. If it is remembered that the modern anastigmats contain six to ten single lenses, their high price will no longer be wondered at



FIG. 10.

considering the above described difficulties in producing a single perfect lens. Another factor which increases the cost of manufacture is the varying optical properties of the material furnished by the glass works. Glass blocks forming part of different shipments are almost never absolutely alike in their optical constants, and owing to this it becomes necessary to frequently repeat the calculations of the proper shape of the lenses, and this of course entails making new grinding and polishing shells, new testing glasses, etc.



FIG. 11.

The next step is the putting together of the single lenses to form systems or groups. They are centered as follows upon lathes of great precision: The operator fastens the lens to the end of the lathe spindle with putty and ascertains if the two images (reflections) of any bright body which are visible in the lenses remain stationary during the rotation of the spindle. If necessary, he shifts the lens in the soft putty until this condition is fulfilled. By means of the testing lever the axis of rotation of the spindle is brought into coincidence with the optical axis of the lens. Then follows the grinding of the edge (Fig. 11), and as soon as the proper diameter is obtained, the spindle is heated and the lens is removed to be connected in the joining room with mating lenses which have been treated in the same manner. Goerz's double anastigmat, as is well known, consists of two equal halves, each containing three lenses (Fig. 12). The lenses are joined or connected with a very thin layer

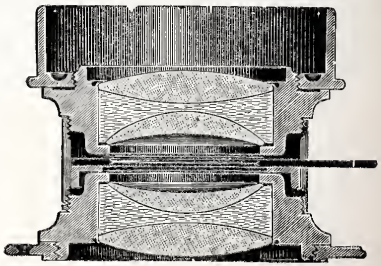


FIG. 12.



FIG. 13.

of Canada balsam. The operator, after carefully cleaning the lenses and coating them with warm balsam, presses them well together (Fig. 13), and brings them upon the



FIG. 14.

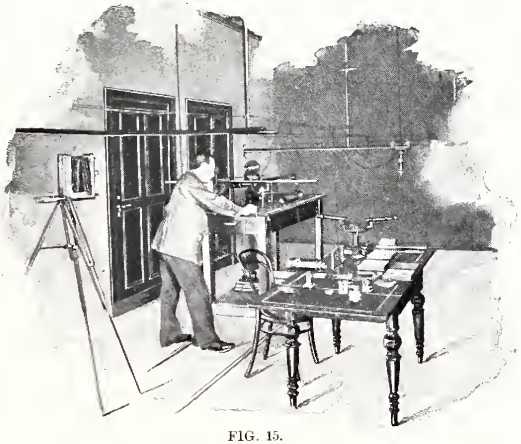


FIG. 15.

joining plate of the level apparatus (Fig. 14), in order to center them. At this juncture a testing lever is used, which reveals even the very slightest inaccuracy in the position of the lenses. The systems of single lenses thus completed are thoroughly examined as to their optical



FIG. 16.



FIG. 17.

quality with the large testing apparatus (Fig. 15). As a testing object the operator employs a series of lines lighted by an incandescent lamp and capable of being shifted at will to the left or to the right. The images of the lines formed by the lenses must be clearly defined in the optical axis and at a distance from it as well, and the image of the testing object must remain stationary when the objective is turned about its axis. The same apparatus is used for determining, within one-twentieth of a millimeter, the best or most favorable interval or distance between the two systems, that is the distance with which the clearest definition is obtained. While this distance has been determined beforehand by calculation, small corrections are always necessary. This having been done, the lens systems are sent to the mechanics' rooms, where they are to be mounted. The proper mounting of the lens is of as much importance for the quality

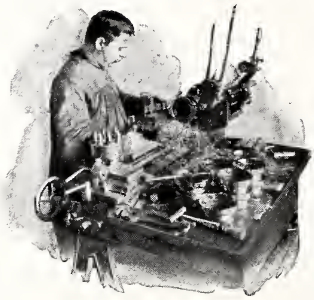


FIG. 18.



FIG. 19.

of the objective as the perfection of the lenses themselves, and a large number of complicated machines is necessary to assure an accurate fit of all the parts. In large shops (Figs. 16 and 17), the blanks for the mounts are turned, the tubes are sawed apart, the flanges soldered in position, and the screw-threads cut, as shown in Fig. 18. The lens systems having been placed in the mounts, they are carefully adjusted (Figs. 19 and 20). Then the objective is again put into the testing apparatus (Fig. 15), and examined as to its working as a whole. If the definition is as good within an angle of 60° as at the axis, the objective is pronounced satisfactory, and is finally passed through the engraving machine to receive the proper inscription, etc.



FIG. 20.

In a testing atelier of a length of 18 meters (Fig. 21), the objectives are, as a final test, examined as to their photo-



FIG. 21.

graphic efficiency by taking pictures of large testing plates; the preceding tests were merely of an optical nature. By these repeated accurate tests, the buyer of Goerz objectives is given the positive assurance of receiving only first-class goods.

THREE FACTORS OF SUCCESS.

BY H. M. GASSMAN.



A CHARLESTON GOAT. By JOHN H. TARBELL.

WHENEVER it occurs to me to make some notes along any line of photography I well realize that there is "nothing *new* under the sun." But this is no great objection when we reflect that *newness* is not absolute but relative. The oldest thing will be new to him who has never seen it. Therefore, these remarks are addressed especially to those who are just peeping above the photographic horizon, many of whom we hope to see reach their full meridian.

Patience and deliberateness are essential for successful work in all the processes from the taking to the finishing of the picture. Just think of the many tons of plates spoiled because of too great *hurry!* There are many more plates under-developed than over-developed. Most people fail to get the picture they want because they cannot wait until the conditions are right. Sometimes the negative is so dense or the sun is so dimmed that the print is not printed deep enough. Perhaps the sun will not immediately obey any commands and the time may pass so rapidly that the remaining ten plates cannot be exposed. The amateur should remember that his success is not marked by the *number* of plates exposed but by what is on the *plate.*

If one is deliberate he again has a decided advantage at each step. After the holders have been filled, the box of dry plates will be closed before the dark-room door is opened. The exposure will be more accurate. The subject can be posed more successfully and naturally if both heads



By WM. J. CASSARD

STILL LIFE

are kept cool. The wrong chemical will not be used and the deadly hypo will play no "conspicuous" part.

Another thing desirable is confidence. Only those who possess it can appreciate what it is to *know for sure* that the developer is proportioned *properly*, that the exposure is *just right*, and that the hypo is *entirely* eliminated. All this can come only through experience and practice. Master your favorite developer by varying the proportions of chemicals and water. Study the exposure by working the lens with a given stop under varying conditions of light. Thus will be acquired a confidence which in itself will be a satisfaction as well as an economizer of time and money.

There are certain things which are essential for success. It is necessary to have a good lens, a light-proof camera, first-class material, skill in manipulation, and a general knowledge of the subject. But, if we fail to mention patience, coolness, and confidence, we have omitted three important factors of success.

= = = = =

SIMPLE TEST FOR SHUTTER SPEEDS.

BY F. GREEN.

It is a matter of congratulation that amateur photographers now take a greater interest in the scientific side of photography than formerly. They are not now satisfied to merely "press the button," but show an inclination to "do the rest" themselves.

When one develops his own plates, prints from them, and does his own toning, he gets better acquainted with his work, and his mistakes of judgment in exposure become more apparent. He will therefore demand greater accuracy in his apparatus.

Accurate exposure tables have been prepared for us, and if we can rely upon our shutters to give the indicated speeds, exposure becomes an exact science. But while it is true that over-exposure can, to an extent, be corrected during development, yet in photographing moving objects,

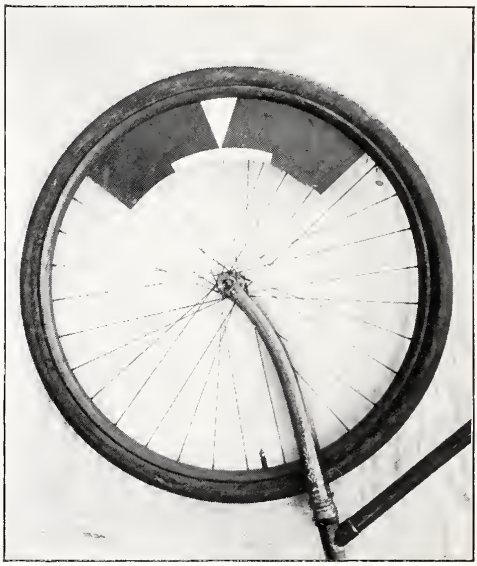


FIG. 1.

when we desire to give the extreme limit of time compatible with sharpness of detail, a slow working shutter is the means of irreparably ruining our work.

Let us, then, be sure our shutters are correct, to know how much to allow for correction. The method of testing them here described is so simple that every amateur should be able to test his shutter speeds; more especially should he do so if his camera is one of the many kinds not provided with speed scales.

The method consists of photographing a revolving bicycle wheel to which a suitable indicator is attached.

As shown in Fig. 1, the device is an arc of black cardboard upon which are pasted the V-shaped indicator proper and the base line, both cut out of white paper. It can be readily attached to the front wheel of a bicycle by means of thread stitched through the cardboard and tied around the spokes at the back.

To use it, invert the bicycle, resting the latter upon its handle bars and saddle in a bright, sunlit place. Set up your camera and focus it upon the wheel and indicator. Set the shutter at whatever speed you select for the test. Now start the wheel to revolving rapidly and make the exposure. Immediately take out your watch and count the revolutions of the wheel for any given time (I count the number of revolutions in ten seconds as being the most

convenient). To avoid the possibility of error, count it over the second or even the third time and, in case of failure to agree, average the results. The wheel will not have slackened its speed appreciably in this time.

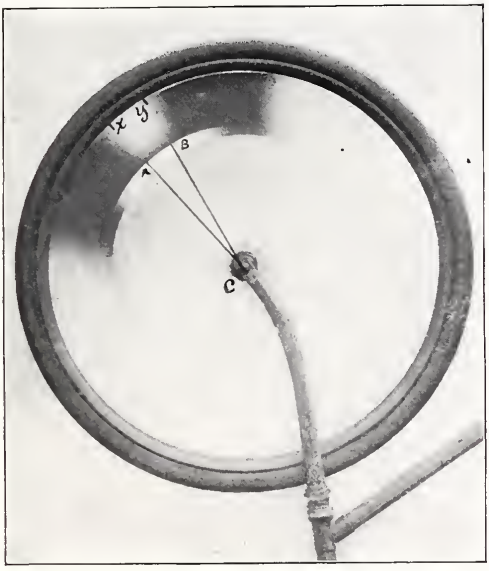


FIG. 2.

A print made from the developed plate will have the appearance of Fig. 2; and now will be seen the value of the base line arc, which may have seemed useless at first. It is desirable to know just how far the mere point of the V indicator moved during exposure; but, as will be seen, a considerable part of the V point, on account of its small size, did not get photographed at all. Lay straight edges along the sides of the blurred V and where they cross the base line make the marks A and B. These, of course, mark the position of the V point at the start and finish of the exposure. With C at the exact center of the wheel, draw the lines A C and B C. Now lay a graduated arc over the print and find the number of degrees between the two lines.

For example: Suppose we had counted 25 revolutions in 10 seconds and we find an angle of 15° between A C and B C; if there were 25 revolutions in 10 seconds, then in one second there were $25 \div 10 = 2.5$ revolutions. 2.5 revolutions are equal to $2.5 \times 360°$ or 900° (the number of degrees of arc through which the indicator passed in 1 second). And since the indicator passed through 15°

during exposure, the time of exposure was such a part of 1 second as $900 \div 15 = 60$. Therefore the time of exposure and the speed of the shutter were $\frac{1}{60}$th of 1 second.

If a graduated arc is not at hand, the same result can be obtained with a divider, as follows: Extend the lines A C and B C until they meet the rim of the wheel at X and Y. Set the divider-points at exactly X Y, and carefully "step off" the rim of the wheel; the purpose, of course, being to find what part of the circumference X Y is. In a case similar to the one just cited, the divider will step around 24 times. Multiply this number by the speed of the wheel and we get $24 \times 2.5 = 60$. The speed therefore is $\frac{1}{60}$th of 1 second.

If one speed of the shutter is correct, probably all of the speeds are correct. This is not always the case, but it is safe to assume that all the speeds are correct, or slow or fast in the same proportion as the one tested.



"SIR THOMAS." By R. H. SCADIN.



STUDY. BY J. CRAIG ANNAN.

MY FIRST CONVENTION.

BY T. PERKINS, TURNWORTH, BLANDFORD, ENGLAND.



ACROSS THE NAVE, GLOUCESTER. By T. PERKINS.

Until the present year, 1899, circumstances have prevented my attending any one of the Annual Meetings of the Photographic Convention of the United Kingdom. This year I was able to get to Gloucester, where the convention met, and my feelings are of a mixed nature, satisfaction with the pleasure this meeting has given me, and regret that I have missed so much in the past. Possibly, however, some of the former meetings may not have been so enjoyable as this; on the present occasion, everything combined to ensure success. Gloucester was well chosen for the headquarters, since its Cathedral Church is interesting beyond all similar churches of the land, because it was the birthplace of that last style of Gothic Architecture, which, however, inferior to the preceding styles we may hold it to be, yet has the merit of being entirely English in its origin and development. At the junction of the north choir aisle with the transept the first perpendicular architectural work was executed, and throughout the eastern part of the church a veil of stone in the new style was, as it were, hung over the massive Norman walls and piers. In the nave, however, the Norman work stands in all its original massive grandeur, though the windows and groining of the south aisle are of

later date. We may regard the decoration of the eastern part of the church as the nation's sin-offering for the murder of one of the Lord's anointed, for after brave Abbot Thokey granted a last resting-place to the body of Edward II., foully done to death at Berkley Castle by that "she wolf of France," Isabella, his queen, which had been refused burial in their abbeys by those who ruled at Bristol, Kingswood, and Malmesbury, various misfortunes happened to the land, which were attributed to the wrath of heaven because the blood of the king was crying out for vengeance, and hence pilgrims flocked by thousands to Gloucester to lay their offerings at the shrine of the murdered king, and the Abbey became rich beyond the wildest dreams of any of its religious body who dwelt within its walls, and this immense wealth was used to adorn the church in that way which seemed best to the builders of the second half of the fourteenth century. But the church at Gloucester was not the only attraction to the conventioners. Not far off stands Berkley Castle and Berkley Church, both full of interest; and a little further the vast ruins of Chepstow Castle and the remains of the world-famed Cistercian Abbey at Lintern. These very perfect ruins, consisting not only of the Abbey Church, but of much of the domestic buildings, may be somewhat hackneyed, for they have formed the subject of many a painting, and of a still larger number of photographs. But, notwithstanding this, the beauty of the ruins of the Abbey, built at a time when Gothic had reached its highest point of excellence at the end of the thirteenth century, in the midst of scenery which is of surpassing loveliness is so great that I have visited the spot many times. I always feel as keen a delight in it, as when I saw it for the first time on a summer night many years ago, bathed in the light of a full moon shining from a cloudless sky.

And as if this were not enough for the district to offer us, there was still a delightful excursion by river steamer in store for the next day, when we visited Ashleworth Church and village with its old time buildings of stone and half timber, and Deerhurst with its Saxon-towered church and



NORTH TRANSEPT. TINTERN ABBEY.

BY T. PERKINS.

recently recovered Saxon front, and the Saxon Chapel of Odda hard by, discovered not so many years ago incorporated in some farm buildings. A few miles further up the river we landed at Tewkesbury, where stands not only the glorious Abbey Church rivalling the Cathedral Church at Gloucester in interest and beauty, but many a picturesque half-timbered house, and the town has an enhanced interest in so far as it is the scene of Mrs. Craik's well known novel, "John Halifax, Gentleman."

It may be that the convention meeting is not the best opportunity for serious photographic work, that the pic-nic element largely predominates, that conventioners with cameras do sometimes get in one another's way, but when weather favors those who gather together for the meeting as it did favor those who met in Gloucester in 1899, a more pleasant week's holiday could hardly be imagined. The free and easy style of intercourse between the devotees of the camera, the opportunity of meeting old friends, and of making the personal acquaintance of those who have hitherto been only correspondents and names, the informal exchange of ideas and views, all make it well worth while to attend such meetings, and some photographic work can be done in the intervals between talking and feasting. Personally I secured a good bag of negatives, considerably enriching my architectural store.

THE OPTICIAN'S MISTAKE.

BY DR. JOHN NICOL.



THE COQUETTE. By GEO. D. FIRMIN.

THE optician is now doing for photography what, ten years ago, would have been deemed impossible. Thanks to the Jena glass; and the skill mathematical and mechanical, with which it is wrought, he is giving us lenses so nearly perfect as to leave hardly anything to be desired; and yet, and solely through the fault of these lenses, the photographs of thirty years ago are from probably the most important point of view, vastly better than most of the photographs of the present day.

From the optician's point of view, the best lens is that which with a given length of focus and a given aperture, will satisfactorily cover the largest size of plate, and so far he is right, but in listing his lenses, when he mentions the sizes that they may be made to cover, he is altogether wrong.

The point of view of the pictorial photographer is different from that of the optician. To him perfect definition is not so important as an apparently correct perspective, and the nearer the optician gets to his ideal, the farther does he lead the pictorial photographer from what should be his.

The photographer, as a rule, knows little about lenses, and from seeing them listed as 5x7, 8½x6½, or 12x10, not unnaturally concludes that they were intended to be employed on those sizes, and gets to speaking of them and buying them as such. In the same way, and for another reason too, the makers of cameras that are sold fitted with lenses, are willingly misled. As a rule, the longer the focus the more costly is the lens, and as the optician lists them and the buyers speak of them as they are listed, the camera makers, taking advantage of the mistake, supply their cameras with lenses much shorter and so much cheaper than they ought to be. The result is that a large majority of the lenses in use at the present time are not much longer in focus than the length of the longest way of the plate, and many are indeed shorter, giving a perspective that is apparently altogether false, exaggerated foregrounds and foreground objects, diminished distances, and village streets much wider than they are long.

It should never be forgotten that for pictorial photography the most important feature of a lens is its focal length, which should never be less than once and a half the longest way of the plate, and that twice that length would be much better.

This unfortunate state of matters would never have happened, and having happened, would soon be remedied if opticians would, instead of mentioning any particular size of plate, simply state the diameter of the circle of good definition that each lens was capable of giving.

An easy way of bringing home the truth of what I have said about the advantage of lenses of long focus, is to examine any collection of photographs and notice how different is the effect of those that are upright from those that are horizontal or oblong, the difference arising entirely from the fact that in the latter the lens was just about the length of the base line, while in the former it was over once and a half that length.



THE BROOK.

BY W. M. HODGES.

A QUADRUPLEX FINDER.

BY O. G. MASON.



FIG. 1.

THAT a "Finder" is a necessary adjunct to a field camera, or any other optical instrument used for securing photographic illustrations of moving objects, has so long been recognized that no argument is required upon that point. The great number of methods and forms which have been introduced by various makers might be somewhat confusing to the novice in selecting something suited to all conditions arising in general practice, especially when working with large cameras.

For convenience in large work, the finder should be detachable, or, in other words, so constructed that it may be fastened to various parts of the camera box, that it may be most easily seen at the selected point for the work.

It may be most convenient to look *down* upon the image in the finder, or to see it from *behind* the camera, or again from the *right* or *left* side. To meet all these conditions the finder herewith illustrated was constructed. It has been in use by the writer since 1886, during which year it was submitted in a somewhat more simple form to a leading manufacturer, who pronounced it too expensive for trade purposes. A few months later a finder involving one of the principles of the Quadruplex was brought out *patented* by a friend of the manufacturer before mentioned. My own device was then laid away except when used in my personal practice, where I have continued to find it so useful as to lead me to now publish it, with the hope that some of my fellow-workmen may find it suited to *their* needs.

The most effective means for attaching the finder to the

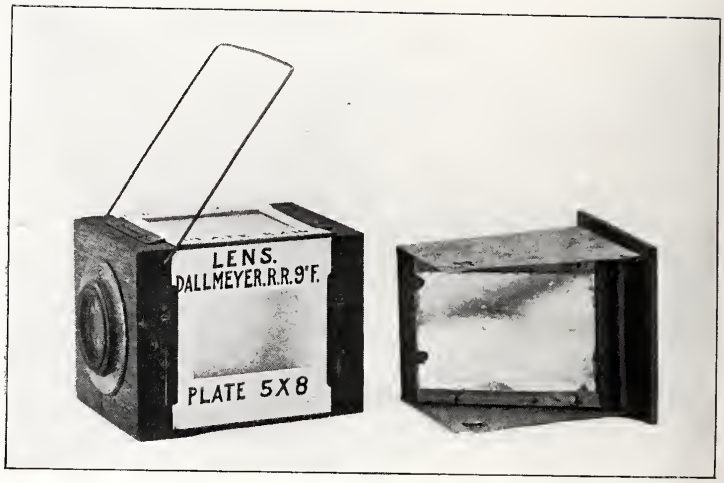


FIG .2.

camera box is by ball and socket joint, or some other universal joint device which will permit the lens of the finder covering the *same* field as the camera lens in use.

As the angle between the object, the camera lens, and the finder is considerable when the finder is used with a large box, some method of adjustment like the universal joint should be provided.

The illustrations show the finder so plainly that very little explanation of its construction is required.

It consists of an exterior and an interior shell. The first carries the lens, and ground-glass focusing screens on three sides ; the slides for holding the "field cards" for showing the field covered by lens of camera on any chosen plate, and the ball or wire loop for holding the inside shell in position. The interior shell carries a ground-glass at its back end for viewing the image when standing back of the camera, and a hinged reflector for throwing the image on to the top or either side ground-glass focusing screen. When the image is to be seen in the back of the finder, the reflector is raised as seen in figures 2 and 3. When the image is to be seen on either of the other three screens, the

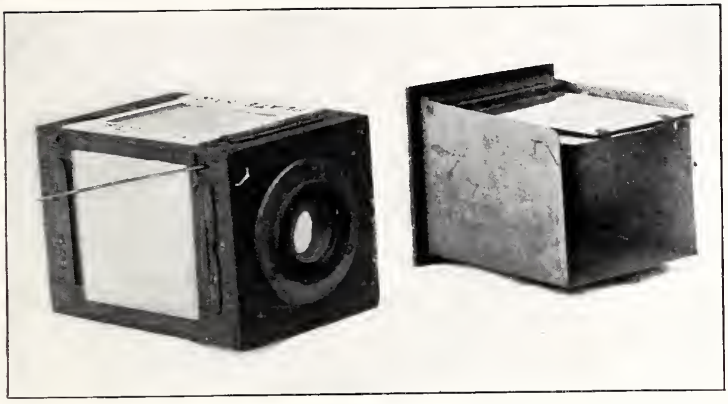


FIG. 3.

reflector remains down, or as shown in figures 4 and 5. The two shells of the finder being *square*, permits the inside shell to be inserted with the reflector turned toward *either* of the *three* screens in the outer shell, where it is held in place by the loop of wire shown in all the figures. The openings in the "field cards" will show just what a given lens will produce on a chosen size plate.

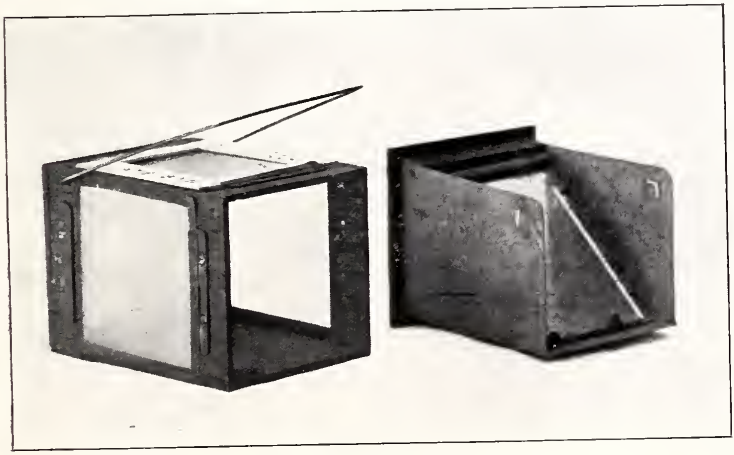


FIG. 4.

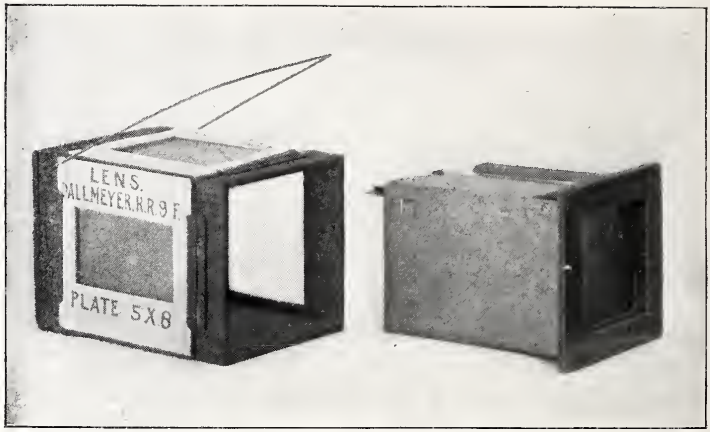


FIG. 5.

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METOL-HYDRO.

BY MILTON B. PUNNETT.

THE common idea is that in a developer whose reducing agents are metol and hydroquinone, each of the agents act separately in contributing their charaeteristic properties to the resulting negative or print.

There is, it can be very easily proven, something more that this something in the shape of a chemical union or mutual assistance.

To make clear our meaning we will use the following formula, as a basis :

A

Water	16 ounces.
Sodium Sulphite (dry)	120 grains.
Metol	30 "
Hydroquinone	30 "

B

Water	16 ounces.
Sodium Carbonate (dry)	120 grains.
Potassium Bromide	10 "



By A. HORSLEY HINTON

FLEETING SHADOWS

To develop take equal parts A and B. If we omit the metol from the formula the amount of alkali is so much less than what it should be for a perfect hydroquinone developer that the image will make its appearance but very slowly. However, if we introduce a little metol, the image will appear quickly and with an intensity altogether out of proportion to the amount of metol used.

Likewise, if we omit the hydroquinone in the formula the image will appear quickly but not very dense and of a grayish black tone.

The introduction of a little hydroquinone will not slow the development but will give purer blacks and greater density.

The questions are, does the metol act on the hydroquinone causing the latter to be more susceptible to what would be otherwise an insufficient amount of alkali, or does it have an initial action on the silver salts in the film which action makes them more amenable to the influence of the hydroquinone? The writer favors the latter theory. Led by the favorable influence which metol seemed to exert upon hydroquinone, it was thought worth while to try it with resorcin.

Resorcin, as is well known, is an isomer of hydroquinone and pyrocatechin, and although both of the latter are good developing agents the former has never been made to work. In spite of the coaxing of varying amounts of alkali and metol, nothing but a negative answer could be obtained.



ON THE ST. LAWRENCE. BY B. V. TOMPKINS.

EXACTNESS IN STATEMENT.

BY CHAS. E. MANIERRE.



By R. H. SCADIN

IN courts of law witnesses are not permitted to mix up inference with their knowledge. They may state only what they heard said by a party to a conversation. It is not allowable for the witness to say that Jones *wished* Brown to lend him money, but he may say that he heard Jones say, "Brown, lend me money." The jury can then *infer* what Jones *wished*.

It would be advantageous if some such exactness of statement were required of writers for the photographic magazines. Their readers would then know what was intended to be said and the bounds of the writer's knowledge of his subject. It is quite common to come upon such statements as that the writer had made an exposure of a given number of seconds, omitting to say with what size of lens opening. In this case, fortunately, the reader at once knows that the writer has in fact given no information. Much more unsatisfactory are the formulæ which frequently appear. Those of us who have had experience know that a wide variation from the given amounts in the ingredients of most of the formulæ would work no special harm, but there are, however, cases where ruin would follow even a slight deviation from the prescribed quantities, yet no hint of this is given in connection with the formula. If, for example, the formula includes a definite amount of caustic soda as a seemingly necessary ingredient, it is quite likely that the writer really means only that *some* alkali is needed,

and he may himself never have used any other. In such a case, to be fair with his readers, he ought to show them the limits of his knowledge. The average reader cannot know whether the amount given is exactly sufficient and intended to render the resulting mass neutral, or whether it was intended to leave it slightly acid or alkaline, or whether half or twice the amount would not answer quite as well. Possibly in the same formula the temperature is directed to be kept at a certain point, but there is no intimation of how far above or below that point there may be a safe variation. Very likely if the writer could be questioned as to these several points he would be found unable to answer.

For a further example, take the matter of the printing of lantern slides by reduction. Dozens of articles have been written in which careful directions have been given for excluding all light in the space between the negative to be copied and the lens. Other articles assert that this is quite unnecessary. One statement or the other is of course true, but not both, and the test not at all difficult. In many of these articles there were doubtless excellent suggestions which were in fact derived from the knowledge of the writers, but there is no way for the reader to identify such suggestions. If these writers had said that it is the usual practice to exclude the light, etc., and had given the alleged reason, the reader would know that they do not pretend to knowledge of the fact.

How many writers have directed, with seeming authority, hours upon hours for print washing, instead of admitting that they were merely following the custom, which we now know was entirely useless. In other articles the tyro is directed to cover his negative only an eighth of an inch deep with the developer, but the reason (to facilitate oxidation) is not given, and no warning of the danger of pin-holes from so slight a covering is given. Another directs the rocking of the tray in development, but fails to say what good it accomplishes or with what developers it may be omitted. Many articles use the imperative word "*use* thus and so," and the helpless reader cannot ask whether the



THEORIE.

BY C. PUYO.

meaning is that it is "convenient to use," or "necessary to use," or "advantageous to use," or "customary to use."

Another failing of writers is in too hasty generalization from exceedingly limited experience. If the beginner who is moved to literary fame happens never to have used any other developer than the ferrous-oxalate he is quite as likely as not to announce to the world in unqualified terms that hypo may be used as an accelerator in developing without mentioning that all he knows relates to but one developer, and some beginner in consequence loses numerous plates before he finds out that it does not work with other developers. In writing on development, more perhaps than in any other department of photography, is there need of exactness of statement. Taking into consideration those variations which are great enough, each in itself, to produce an appreciable difference in the resulting negative, viz., the strength of the light—the amount of each ingredient of the developer—the different developers—the length of time of development—the temperature—the combination of developers—successive use of alkali and of the developer proper—the different speeds of plates—the different brands of plates—the use of restrainers and of accelerators—the different stops of the lens as affecting the character of the negative—all of these considered, the possible number of combinations is almost limitless. It would seem to be moderate to say that there might be found thousands of combinations capable of producing first-rate pictures. For example, in the one matter of contrasts, these might be obtained by the use of bromide, the small stops, or strong developer, or by one developer rather than another, or by the chill of the developer, or by short exposure, etc. It seems that the less experience and knowledge one has on the subject the more assurance he has in coming forward with sweeping statement that some one developer or formula is the most worthy of use. Occasionally a good point is made in short articles on this subject, but any one who starts in to write under the general title of developers



SOLEIL COUCHANT. BY C. PUYO.

ought to have a very wide experience and not to expect to stop much short of a fair sized book.

Possibly the cause of my criticism might be largely removed if magazine editors were themselves more critical in their admissions of articles to their columns.

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SIMPLE PRINTING DODGES.

BY JOHN BEEBY.



By MARIO DEI FIORI.

HOW often do the average amateur and the army of "Press the Buttoners" not wish they could improve their prints, by making some portions lighter and others darker, when a negative gives a black and white result through under-exposure or other faulty manipulation? To help such, the simple method I am about to describe will fully repay for the not more than ten or fifteen minutes of trouble and time expended.

First procure some French white tissue paper, such as used by jewelers (this being the most even in thickness and free from holes). Other kinds will do, providing there are no holes in it; if there are, use it double, which will only take longer to print; the result will be exactly the same. Secondly, some vermilion powder. The next thing to do will be to increase the depth of your printing-frame on the front by fixing four pieces of thin wood all round (cigar-box wood answers well), either by short pins or glue. This will make a depth of about ½ inch or more from your negative; now place the tissue over this and fasten at the corners and between, stretching quite flat; there must be no creases, otherwise they will show on the print. When



FIG. 1.

dry, place negative in the printing-frame, and holding up to the light, negative towards you, with a soft pencil mark lightly on the tissue where those portions are which print too darkly. This done, place the back in the frame and fasten. Now with a small pad of cotton rub the vermilion powder on to the tissue (see Fig. 2), strongly or lightly according to the depth required to keep back the light, going just a trifle over the line, remembering the light will go slightly at an angle, thus: ————. Now take out the back and look through the negative, when you can see exactly where the color is, and the strength. You can correct any place not covered enough, or, if too strong, rub off with the finger. Presuming it to be all right, place in your paper and put out to print, laying flat well out in the open. If placed at an angle in the window or elsewhere, allow for the angle of light. Examine when about one-third printed, correcting by adding more color to places or rubbing off if too thick on, according as it needs; this will show exactly how the mask is modifying the print.

The accompanying illustrations fully show the method and results. This took about ten minutes to fix. Fig. 1,

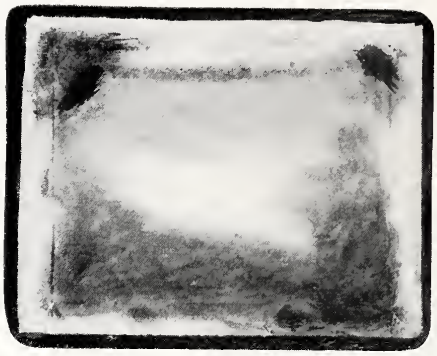


FIG. 2

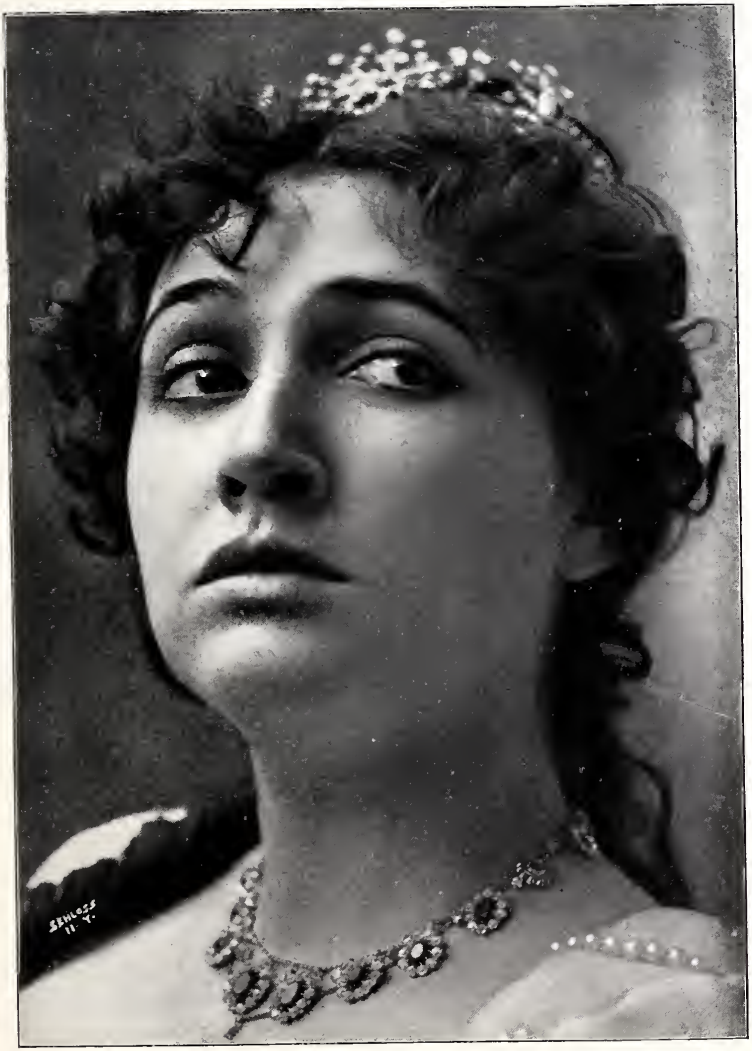
is a print from negative in original state; fig. 2, the mask; and fig. 3, the manipulated print.

To increase the light on any small part, with the tip of your little finger put a spot with oil; this, making the tissue transparent at that point, will print more.

For a thin negative, print through yellowish-green glass or tissue in the sun, and print very strong.



FIG. 3.



PORTRAIT,
BY SCHLOSS.

VELOX PRINTING.

BY F. E. FAIRBANKS.



"YES MA'AM." By G. C. THOMAS.

LAIMS of business necessitate that my printing has to be done evenings, by artificial light. Until recently, bromide paper has been the only paper available, and I have used it constantly ever since it was put on the market by the Eastman Company. Recently the claims of Velox paper have been pressed upon the photographic public, the results seeming to surpass those obtained on bromide in many respects. But as I was confined to the use of a kerosene lamp for making the exposure, the great increase in the time necessary for exposing it seemed to bar its use to me.

Later, the portrait special was brought to my attention as being more sensitive than the carbon, and, upon trial, found that I could use it with much less exposure than the carbon, and could get off quite a good evening's work by its use.

A few days ago I had occasion to make several prints, and found that I had only the Carbon Velox on hand of the size required, and I was dreading an all-night session printing them, when the thought struck me, why not try magnesium for exposing it! A trial was made with such satisfactory results that I thought it ought to be brought to to the attention of amateurs in general.

I used a small spirit lamp to ignite the magnesium ribbon, as it does not ignite readily from a match. Taking



DEPARTURE OF THE STORK.

BY R. W. WOOD.

a measured length of magnesium ribbon in a pair of plyers, I lit it in the lamp, and when it was consumed the print was developed.

By having the quantity of ribbon constant, and the disance of the printing frame from the source of light always the same, no trouble should be had in obtaining uniform results.

To use it intelligently, it should be used in a systematic manner. For a starting point in such systematic use, I have assumed the distance of two feet to be the proper distance from the source of light to the printing frame when using Carbon Velox; and when using that grade of paper, expose *all* negatives at that distance away from the burning magnesium ribbon.

To allow for negatives of different densities, different lengths of the ribbon are burned. Some may require an inch, others may require up to five or six inches. The proper amount having been ascertained by trial, it should then be noted on the negative envelope, for use should it be necessary to print from it at any future time. Very little difficulty will be experienced in thus classifying the negatives, and they will soon be termed one, one and a-half, or three inch negatives, as the case may be. In using other varieties of paper which may be more rapid than the Carbon Velox, I would suggest that exposures still be made by the already determined standard length of ribbon, but at an increased distance from the source of light, to correspond with the greater sensitiveness of the paper. To illustrate: A certain negative, using Carbon Velox, at two feet distance from the light, will give a properly exposed print by the combustion of one inch of magnesium ribbon. The same negative, using a more rapid paper, as the Portrait Special Velox, exposed to the light of the same quantity of magnesium, might need to be placed four feet distant from the source of light, the proper distance to be determined by experiment, and once settled, to be used in the exposure of *all* negatives, when using that particular



"MAY."

BY C. PUYO.

brand of paper. It seems to the writer that work along these lines would result in greater uniformity in results, and economy in material.

SOME WORDS ON JUDGMENT.

BY H. EDWARDS-FICKEN.



"THE GYPSY BELLE." By EDGAR FELLOES.

IF one may arrive at a conclusion from the ever increasing mass of photographic illustration in the journals devoted to photography the time has arrived for calling a halt, or the exercise of a wiser judgment in selection.

If this discretion were displayed and the bad art of the undisciplined photographer relegated to the depths, the beginning of judgment would have a momentous influence and would bear golden fruit in the natural sequence of things.

Judgment might be displayed in backgrounds. The professional might forego his stucco rocks, his impossible chairs, his hideous tables, his impostures of land and sea, and might eventually come to see their utter vileness. The amateur might forego his rivalry in posing his unfortunate subjects against such striking natural effects that they put his victims literally out of countenance.

Judgment might be displayed in the titles of photographs. Silly verses which but remotely connect with the pictures they accompany would then be omitted, and silly titles such as "Study" tacked on to a bizarre portrait would no longer suggest the satirical query "Study" of what ?

Judgment might be hoped for in the mounting of photographs. Gilt lines would then become a forgotten horror, and the "Special" mounts of the album and card manufacturers would be banished forever for their crimes. The best shades of plain half-toned colors adapted to the requirements of each especial photograph would then alone be used.

Judgment might be expected to arrive in the wiser selection of printing papers. Snow scenes would no longer be printed on pink albumen nor delicate architectural detail on rough grained printing-out papers.

Judgment might come in the framing of photographs. Then simple black mouldings would replace the garish gilt, and antique oak in various and harmonious stains become the rule, and not the exception.

Judgment would come in the selection of scene and pose. Incongruous figures would not intrude in photographs of celebrated buildings, nor natural beauties of landscape be ruined by misplaced animals.

Finally, relevancy and harmony would bear their full and proper share and eccentricity for eccentricity's sake would be cast out.

ON THE MOUNTING AND FRAMING OF PHOTOGRAPHS.

BY JOHN BARTLETT.



By SCHLOSS

SELECTION in character of mount is seldom made upon constant principles governed by rules of artistic taste. "Motley is the only wear." The blues, the greens, the reds, the blacks, the grays, were at one time drafted indiscriminately into service without any consideration and without fear of the injurious effects they might exercise upon the appearance of the photograph. Nowadays the tendency of taste in mounting is to the steadfast, sober and demure form, and nearly every variety of print has donned the gray and is hardly thought worthy of admission to an exhibition unless enshrined in a Rembrandt mount and a funereal frame.

It is contended that the primary object in mounting and framing a picture is to isolate it from surroundings, so that the attention of the spectator may be directed especially to it, and that the best service a mount and frame can do for a picture is not to interfere with the effect, but experiments with different tints of mounts demonstrate that such neutral ground in the action of accessories is not tenable. If the mount is not for the print it is against it. If the mount and frame do not enhance the good qualities of the photograph they do positive injury by their presence.

The nature of the subject as well as the surface, finish, color, etc., of the photograph must be taken into account in fixing upon the variety and tint of the mount.

A portrait or genre subject requires a different style of



ROSES.

BY E. NICOLAI.

isolation from a landscape, and a glossy surface picture deports itself differently from a plain paper or platinum print when placed upon the same kind of mount.

There seems to be an almost universal favor for matt-surfaced pictures by many it is true who have artistic feeling, but also by many who affect a taste and profess an abhorrence for the vulgar shine of an albumen or high gloss aristo. Here is not the place to discuss the question of art values and we would merely say that glossy surface is not despised by our best painters to heighten effect, and in miniature painting, which in size is akin to the average photograph, gloss is essential to set forth the detail and finish of the most exquisite work.

There is one thing to be considered in vacillating between the selection of gloss or dull, that is the peculiar character of the negative. Many of the platinums, veloxes, bromides, and other plain prints made by amateurs of inexperience who are possessed of much artistic taste in eomposition and selection would look better (at least to the technical photographer) if their virtue had been translated in high gloss.

The amateur, while gazing upon the lovely atmosphere or the delightful artistic haze he has secured in his negative, does not preceive how thin the negative is and how delicately the gradations of light and shade are represented, and in the further gratification of artistic feeling, or perhaps from necessity of conforming to the ruling passion, conquers reason and prints upon platinum or velox, only to find that all the delicacy and beauty of the original negative has vanished—delicacy and beauty which the despised high gloss would have faithfully rendered by careful and judicious printing and shading. Moreover, the defects in the negatives are not so easily masked with matt papers as with high gloss.

The artistic beauty and finish of the platinotype and the velox print is associated only with negatives of the highest grade and of peculiar character, therefore, if the negative work is not the very best and work suitable for platinum or velox or bromide, etc., rest content or rather



A SLEEPY AFTERNOON.

BY GEO. W. NORRIS.

choose without hesitation the much but unfairly despised high gloss paper, to bring out what of latent beauty there is in your negative, and the real artist will not twit you on your vulgarity for admiration of shine. But, as my habit is, I am wandering off "by devious paths to the wide ocean," and must go back to my subject.

As to the tint of mount most appropriate, everyone knows of what value to the artist is the knowledge of simultaneous contrast of colors. It is also important for the photographer to know the effect of the juxtaposition of light and shade and various hues.

The light of one object may be comparatively dark when placed in relation with the light of another object.

A piece of gray paper out in the full glare of sunlight is brighter than a pure white sheet in a dark corner of a room, yet we call the piece in the sun white and the piece in the dark gray, and relatively speaking we are justified in our decision.

An object of a certain tint always appears darker when placed close to a very much lighter object and *vice versa*.

Let us take for instance a medium gray, and by the effect of placing it upon two different grounds, one of which is lighter, the other darker, than the superimposed gray itself. To any ignorant of the effect (provided they have no visual defect) the phenomenon is most striking. Upon the lighter ground the gray object will look much darker, while upon the darker ground it will appear much lighter in tone.

It is hard to realize that two patterns cut out of the same piece of gray paper could look very dissimilar in color, and we only realize the *truth* of the *deception* (excuse the Irish bull) by placing the two pieces on the same ground.

It goes without saying that this change of brightness by contrast with the ground is exactly what takes place, although one is not conscious of the effect, when examining a photographic picture. When a certain photographic tone is brought in juxtaposition with a particular mount, its degree is altered according as the mount is dark or light, and those who are studying after the best effects should give careful



STUDY. BY J CRAIG ANNAN.



SOAP BUBBLES. By MAURICE BREMARD.

attention lest the beauties of their print be neutralized or made inharmonious by association with an inappropriate mount.

But something further than modification of tone is effected in the photograph by the character of the mount.

The whole perspective of the landscape and tone values of the picture may be altered and injured by the inappropriate mount. I remember having a beautiful landscape which gave me much pleasure by the delicate rendering of atmosphere in the distance, which I was anxious to show at one of our annual photographic exhibitions, and thinking to improve it, I remounted it upon what I thought a very artistic mount, but what was my chagrin to find that much of its beauty had disappeared. The change I thought had been produced by the washing out of the photograph in the water in which I had soaked the mounted print, but a freshly made print, which was to my entire satisfaction before mounting, presented the same appearance. The distant

mountain outline seemed much more definite than I thought it ought to look. In fact, the whole perspective was different, the distance was entirely changed, and to my eye, the delicacy I had delighted in was gone. It was some time, unfortunately, after the exhibition was over and the awards given out, that I was reading a book on Color intended for Painters, that I learned of the change produced in tone by association. The delicate grays or browns or purples of a fine photograph will be deepened or lessened by juxtaposition of the mount, and the distance in the landscape will approach or retire accordingly.

Have you not frequently noticed the difference in the appearance of a portrait when vignetted and when printed plain? Perhaps you did not imagine that the difference in



"AU PRINTEMPS." By C. PUYO.

the ground was responsible for the difference of the appearance of the likeness and over-expression.

It is not the place to go into the philosophy of this law of association of color, a topic which belongs to physiology, not to art directly. We shall not, but shall merely say it is really worth trying the effect of different colored mounts when mounting your photograph and not persist in using the Rembrandt or any other beautiful style which may be the ruling fad.

The mount is truly the wedding garment for entry of your photograph into the feast of art.

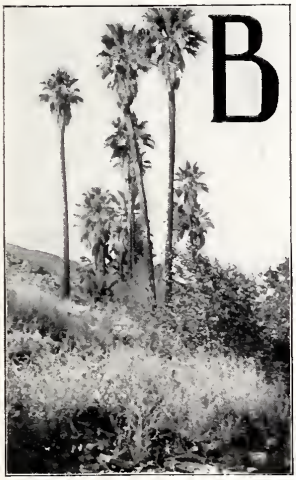
Our title has "Framing" as part of the subject intended to be treated, but photographers do not sin so against taste in this direction as in former days. Flat square frames in plain gilt or dark woods, with modest mouldings, are in vogue, and the fashion is a good one. Deep set frames also produce some very fine effects.



By SEYMOUR CONWAY.

HINTS TO PHOTOGRAPHERS ON FOREIGN TRAVEL.

BY JOHN BUSHBY.



FAN PALMS. By C. C. PIERCE.

BEFORE making a journey out of the beaten track several important matters must be seriously considered by those who have taken up photography as a hobby. I am not writing so much to those who are content with the most recent development of the spool camera and who allow the manufacturer to do all the work for them, but to those who look upon photography as a more serious pastime and are willing to take trouble and sometimes put themselves to great inconvenience. Many of us make preparations for travel with photography as a primary motive, and such ardent disciples I do not feel confident to advise; but there are many who are new to it who have gained some experience at home and are desirous of practising further afield to whom some practical hints may be useful.

The camera must always be a matter of individual taste, and so long as the worker knows his camera intimately, one is as good as another. Personally, I am not a believer in a complicated or too small a camera. No doubt, as to the latter point there are weighty arguments against me—such as being less obtrusive, lighter to carry, and much less expensive to work. My own hand camera would be considered as cumbersome by most people, being a 6½ x 4¾ box camera. So far as machinery is concerned, it is simplicity itself. It holds a dozen cut films in sheaths which, by a lever, are made to fall down after exposure and lodge in a well at the bottom. The lens is a Taylor, Hobs & Taylor, about 7-inch focus. There is a Thornton & Pickard time



IN THE FONDAK, TANGIERS. By JOHN BUSHBY.

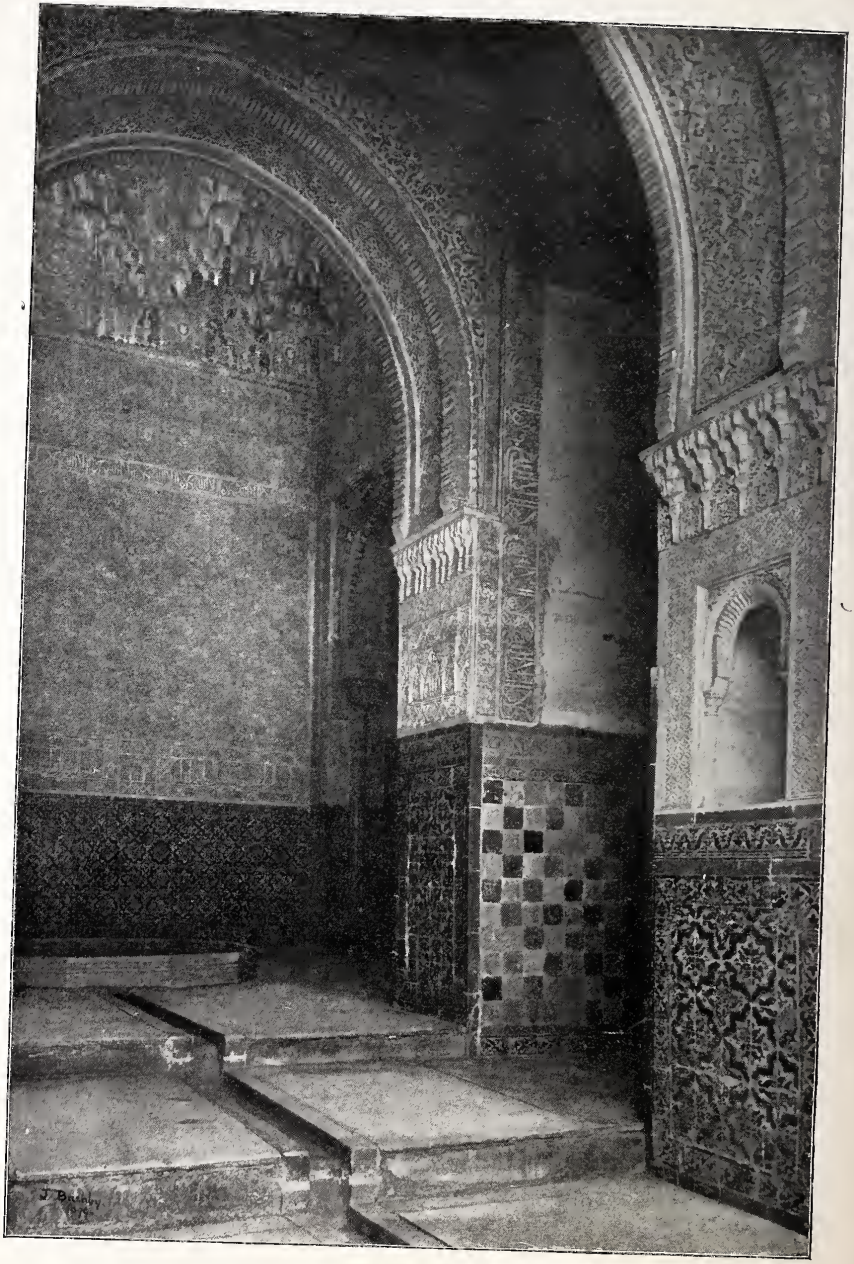
and instantaneous shutter behind the lens with ball release, and I have two bright finders. However, whatever your camera may be, don't take one straight from the maker, on your travels, with mechanism you are not thoroughly conversant with. The camera I allude to above is that which I mostly use when abroad in crowded streets and when in a hurry, but for more serious work I carry a 7½ x 5 stand camera, which is convertible into a stereoscopic. I don't suggest for a moment that everyone should burden themselves with such an outfit, but if work is to be taken up seriously, you must have good machines and not fancy toys, and be content to carry weight when you cannot get any one else to carry it for you. Plates or films? To my mind, there is no question; films having the advantage of lightness, unbreakable, free from halation, easy to stow away when done with, and an advantage that I have never heard claimed for them before—the absence of pin-holes—which, I am of opinion, are caused in plates to a great extent by particles of glass. The disadvantages are expense and not altogether freedom from peculiar markings. As to whose make is best I am not going to offer advice, as I have never used but one brand; but whichever is used, let the traveler



IN THE SOKO, TETUAN, MOROCCO. By JOHN BUSHBY.

use two or three dozen before starting, so as to test them well. One of the knotty questions for me when contemplating traveling is how many films am I to take. Now, for a short holiday, you are likely to use a much larger number proportionately than for a long one; but I calculate for two months' traveling half-a-dozen films a day is ample. Of course, there are many days on which none are used, so there *are* days when you can easily get rid of a dozen, but they are few and far between, if judgment in selection is used. My films are put up into dozen packets, and each five packets are placed in a tin box which is made air-tight by sticky tape. Immediately after exposure they are replaced in the tins and sealed up, so that I run no risk of damage from atmospheric causes. On each tin there should be a label in the various languages of the countries you intend to pass through, stating what it contains and that exposure to light will damage them. Of course, a changing lamp is a necessity, but a folding red fabric one is all that is required, and in this fag ends of candles can be used if night-lights fail.

A broad camel-hair brush for dusting plates is far superior to velvet or other dodges. I am a strong believer in exposure



THE ALHAMBRA. (SPAIN.)

BY JOHN BUSHBY.



IN THE SOKO, TANGIERS. By JOHN BUSHBY.

meters. Take whichever you are accustomed to, but I am never without one of Watkins'. An exposure note-book is a most important point for good work. Granted that the light and exposure are identical day after day, but the subjects are ever varying, and the principal features of each exposure should be jotted down, and are invaluable at time of development, as they will guide you as to the subject in hand whether contrast is wanted or to be avoided.

Some advocate development of occasional plates *en route*, and with this object I have always carried compressed developers, etc., but invariably bring the packet back unopened. No doubt this is laziness, but I have an opinion that these tests are unreliable, and I consider a better plan is to take the first half-dozen pictures in duplicate, and with these you can experiment with first of all on arrival home. Of course, it greatly depends on what stay you make in each place you visit, but the rule I follow is to be very economical with my films the first day, and rather walk round making mental notes as to what is most characteristic of the place and worthy of reproduction In spite of this precaution, I find a good deal of rubbish.



LOADING CATTLE, TANGIERS. By JOHN BUSHBY.

When actually on the war-path with a hand camera, I prefer to be by myself. You attract less attention and can loiter about without being a nuisance to your friends who, when present, are no doubt wishing the beastly box at the bottom of the sea.

When out with a stand camera, however, I engage a native, even if only a boy, on the principle of a thief catching a thief. You will find that there is a certain honor amongst even boys, and if they see one of their number earning money, they are far more likely to leave you alone. As to selection of subjects, experience alone can teach; but you can bear the following cautions in mind: Don't get too near your subject; if so, you will be bound to have movement, besides probably under-exposure; ten yards is quite near enough, and then if figures are moving across the camera it will require excessive speed of shutter to get sharpness. A very crowded street or market does not make nearly such a good picture as one with a few figures only.

Remember that in many places natives, whilst they don't actually stone a photographer, they don't like being taken. For instance, in such places as I have illustrated these notes with, in Morocco, all good Mahommedans would hide their



By A. HORSLEY HINTON

SUFFOLK MEADOWS

faces on seeing a camera pointed at them. It is not difficult with a little practice to get good studies without the subject being aware that they are taken.

Final caution: When your negatives are all developed, don't consider it necessary to print from all. Weed them out well, and even those selected cut down unmercifully, only showing what is good.

The new reducing agent—persulphate of ammonia—has come as a boon to the hand camera man, as a good deal of chalkiness in subjects of great contrast, such as Eastern scenes invariably present, can be obviated.

= = = = =

CHILDREN OF THE MIST.

BY MRS. E. MAIN.



A BIT OF SKY. By G. W. NORRIS.

PHOTOGRAPHERS whose lot is cast in winter quarters around which snow and sunshine abound, have infinite opportunities for securing beautiful pictures at a time of year when the cameras of most of us are laid aside.

Of the many fascinating subjects which under these circumstances present themselves, none are more lovely or more difficult to render satisfactorily than the so-called ice-flowers which form on the frozen surfaces of lakes, and, indeed, wherever open water exists in a sufficiently low temperature.

The examples shown in the accompanying illustrations were photographed at St. Moritz in the Engadine, where sometimes one cold night is long enough for the birth and growth of these fragile children of the mist. We see in the afternoon a black icy surface. Next morning this is white with crystals, each point reflecting a gem-like blaze of



No. 1. ICE FLOWERS FORMING.



No. 2. SAME, TWENTY-FOUR HOURS LATER



A BED OF ICE FLOWERS.



DETAIL OF ICE FLOWERS.

colored light. The mist has frozen, and through the night air the tiny particles have floated down, attaching themselves in marvelous order and regularity to the nucleus which first forms and acts as a sort of stalk to the rapidly growing flower. To render these glittering crystals as near the size of nature as possible, the camera has to be placed very close to them and hardly raised above the surface of the ice. I used a 10 x 10 camera, with exceptionally long extension for the detailed view, and approached to within two feet of my subject. The exposure was made with *f*/64 on a Lumière rapid plate, and lasted a second.

A prolonged paper on the photography of ice flowers would be out of place, so I will content myself with pointing out a field for the camera which as yet seems hardly as fully explored as it deserves.

WHAT AN ARTIST SAW CROSSING THE FERRY.

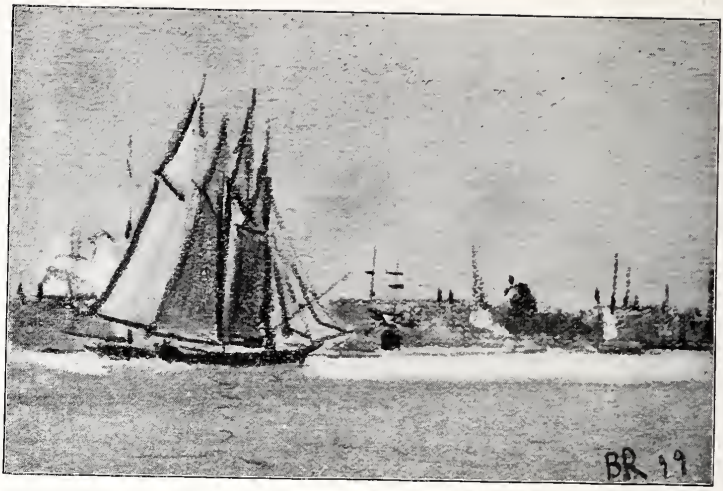
If photographers only knew the pleasure and assistance to be derived from the ability to make sketches from nature, many more would give some of their time to studying.

One of the principal advantages is that the eye becomes trained to see many beautiful little bits of composition that the uneducated eye fails to perceive, thus materially assisting the photographer when using his camera.

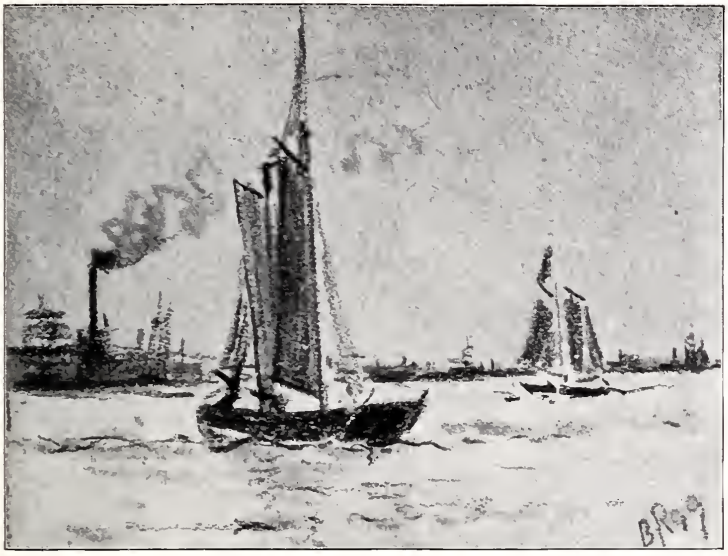
The following little sketches were made by Mr. B. J. Richardson, who has for thirty years been in the employ of Sarony as operator and artist.

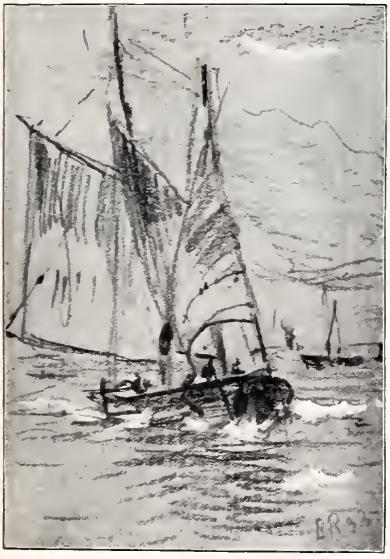
How many of us there are who have travelled backward and forward on ferry boats, and seen but little of interest. Mr. Richardson secures some charming little studies with little material, and the photographer, if he waits his opportunity and uses his instrument correctly, can do likewise—indeed on the different rivers surrounding New York City will be found material enough to last a lifetime.




BR 99


BR 96







A FEW HINTS.

BY CHARLES L. LOCHMAN.

A SIMPLE fixing and clearing bath is made by dissolving ½ ounce aluminum sulphate and 1 pound sodium hyposulphite in 5 pints of water. It may be set aside over night, and then filtered through paper or absorbent cotton.

Convenient vessels for the dark-room may be made from ½ gallon and gallon bottles (of druggists), by breaking off the top by means of saturating a 3-ply cotton twine with alcohol and tying it evenly around the bottle just below the bend, setting a burning match to the cord and, when the flame dies out, quickly dipping the top of the bottle, as far down as the cord, in cold water, and the top comes off evenly, when the sharp edges may be smoothed with a file. Care must be taken not to leave loose ends of the cord with alcohol hanging down the side of the bottle.

Light dishes for fixing or developing plates may be made from ferrotype plates by cutting them 3 inches larger each way than the desired dish, and then bending up the four edges at right-angles to about the depth of an inch.



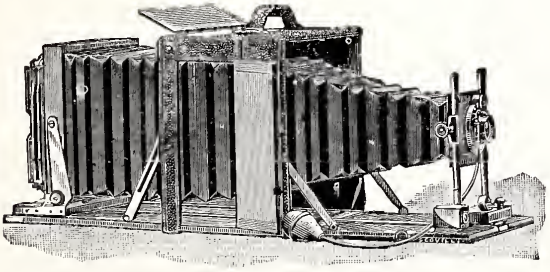
THE BATHING HOUR. By SEYMOUR CONWAY.

NOVELTIES OF THE YEAR.



THE photographic world has not chronicled as many inventions and photographic novelties in the past year as one would naturally be led to expect. The camera factories have not made any decided change in the model of cameras, although the already numerous styles have been vastly improved. The long focus style is still the choice of the progressive amateur, and the reasons are so obvious for this preference that its popularity will doubtless be greater the coming season. There are a host of amateurs graduating daily from the Kindergarten school of button pressers, who have high artistic aims in one or another branch of the photographic art, and as the long focus reversible back camera possesses features for universal application, the choice of such graduates must invariably be for a long focus camera. The long focus reversible back Sologragh camera still maintains its unique position. The claims advanced by the manufacturers of this camera are very broad, and the popularity of the Sologragh seems to substantiate all the manufacturer's claims for superiority. We will describe the camera in the manufacturer's own words :

The name of this camera is in itself a description of the instrument. It is a Sologragh camera, designed for the more advanced amateur photographers, who feel the necessity of combining in one instrument, in a practical way, the features which are requisite for almost universal

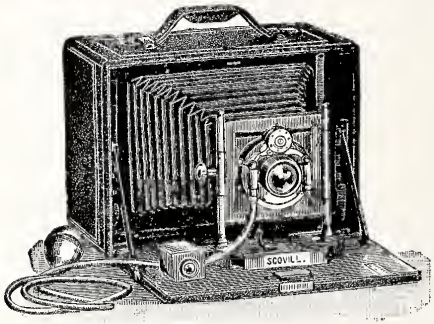


application; this without materially increasing the bulk, weight, and price of the apparatus. The long focus reversible back Sologragh resembles the regular Sologragh. It is of the same high grade of workmanship, made of selected mahogany, well dove-tailed throughout, with French hand polish. Its brass trimmings and adjustments are all hand-

made, possessing the neatness and accuracy which, for the same reason of being hand-made, the Swiss watches possess. It has a double swing-back swinging from the center, rack and pinion movement, reversible finder with hood to screen the visual. It also has a front that may be raised, lowered, or slid to either side, as the foreground should require. The front operates on two brass rods, which allow any desirable latitude in adjusting the foreground in the picture. As the name indicates, it has a reversible back, which adjustment is of the greatest importance when the camera is used on the tripod, the position of the plate being readily changeable without moving the camera. It has *a greater focal capacity* than any other similar camera on the market. It is the only camera of this style which has patented independent bellows for back and front draw with an ingenious device to support the bellows in the center, so as to keep them from sagging, which is one of the greatest defects in all other cameras.

This camera is of inestimable advantage for photographing surgical operations, where it is necessary to obtain as large an image as possible.

For the use of long focus lenses—for copying, enlarging, and all



other purposes requiring an extended length of bellows, the long focus reversible back Sologragh is particularly well adapted.

The lens is the Sologragh rapid rectilinear. Being symmetrical, the front combination may be removed and the rear lens used alone, which practically doubles the focus. For mountain scenery and subjects at long range, this is often an advantage, as the objects in the view appear larger in the picture.

The new unicum shutter having a triplicate movement, with Iris diaphragm, pneumatic and finger release, is furnished with the long focus reversible back Sologragh, and forms a prominent part of the outfit. It works between the lenses without noise or jar, and may be adjusted for time exposures as well as for rapid instantaneous work.

The view finder is located in a convenient position on the bed. The



"AVE MARIA."

MADE ON HAMMER PLATES. BY E. P. OSBORNE.

ground glass screen is spring actuated, receding to permit the insertion of the plate-holder.

Glass plates, cut and roll film may all be used. Combining the desirable features of both hand and view cameras, the long focus reversible back Solograph camera will appeal to and be fully appreciated by a very large class of both amateur and professional photographers.

When in doubt as to the best camera made, compare the Solograph with any other on the market.

FOCAL CAPACITY OR LENGTH OF BELLOWS:

4 x 5	5 x 7	6½ x 8½	8 x 10
19½ inches.	26 inches.	32 inches.	35 inches.

SPECIFICATIONS OF THE SOLOGRAPH LONG FOCUS REVERSIBLE BACK CAMERAS.

Size.	Measure.	Weight.	Front Draw.	Full Draw.	Size of Front Board.	Distance between Lens Board and bed.
4 x 5	5¾ x 7½x 7½ in.	5¼ Lbs.	12 in.	19 in.	2⅜x2½ in.	1½ in.
5 x 7	6 x 9¼x 9¾ "	7½ "	17¾ "	26 "	2⅝x2⅝ "	1¾ "
6½ x 8½	6¼ x 11¼x 11¼ "	8 "	19 "	31 "	3¼x3⅛ "	2¼ "
8 x10	7 x13 x12¾ "	11 "	19 "	32 "	4½x4½ "	2½ "

Next in point of importance to the camera, comes the dry plate, and in that direction marked improvements have been made especially in regard to extreme sensitiveness, viz.: rapidity. The new dry plate, made by the progressive American manufacturers, the Hammer Dry Plate Co., is the greatest boon to the amateur. We refer to the Red Label, Special Extra Fast, the rapidity of which, we believe, surpasses that of any other plate made, while preserving a great uniformity and softness, characteristic of that brand of plate.

The decided onward step, however, has been in the direction of an improved developing agent, which every day reveals greater possibilities in the development of the latent image. The new developer is pyrocatechin, for which the following claims are advanced:

Non-actinic solution, which removes all possibility of fogging the plate; it works better than pyrogallic acid, does not stain the fingers, and what is still more important, does not poison the fingers as most all other developers will do at times. But what will our readers think when they learn that this developer may be prepared in one solution, for simultaneously developing and fixing. It seems incredible, but we give formulæ for those who may wish to try it.

FORMULAE.

Direction I.—For preparing the pyrocatechin-phosphate-developer:

SOLUTION A.

Crystallized sulphite of soda	25 grams
Pyrocatechin	5 grams
Water	250 grams

SOLUTION B.

Ordinary crystal phosphate of sodium	47 grams
Caustic soda (purified, in sticks)	5 grams*
Water	250 grams

Mix one part of A with one part of B and from one to three parts of water. If the exposure is not absolutely normal we recommend to add to the above developer a few drops of a solution of bromide of potassium (1.10).

For bromide paper take :

10 c.c. of A.
10 c.c. of B
60 c c. of water.
3 drops of bromide of potassium (1.10), and in order to obtain deep black tones, add

Direction II.—Concentrated developer in one solution.

Dissolve in the following range :

Sulphite of soda, crystallized	100 grams
Caustic soda (purified, in sticks)	14 grams
Distilled water	400 c.c.
Pyrocatechin	20 grams

The pyrocatechin must not be added until the sulphite and the caustic soda are entirely dissolved. The ready developer is filled in bottles and corked; thus it keeps a very long time. For use the concentrated developer is to be diluted with from ten to twenty times as much water. Diluted with the smaller quantity of water the developer works very quickly and strongly, with more water it works slower and softer. The normal proportion is one part of developer in fifteen parts of water. An addition of bromide of potassium is not necessary with normally exposed plates which are working without fog. Diluted accordingly this developer is very much recommended for bromide paper.

Direction III.—Developer in two solutions :

SOLUTION A.

Sulphite of soda, crystallized	50 grams
Distilled water	500 c.c.
Pyrocatechin	10 grams

SOLUTION B.

Caustic soda (purified, in sticks)	7 grams*
Water	500 c.c.

For use, one part of solution A is mixed with one part of solution B and from two to six parts of water. The normal composition is one part A, one part B, and four parts of water. The same as with the

* If it is found difficult to weigh exactly 5 grams of caustic soda, put a larger piece of it on the scales, weigh it, and add ten times as much water; instead of the above 5 grams of caustic soda take in this case 50 c.c. of this solution, and instead of the said 250 c.c. of water take only 200 c.c.

developer in one solution, here the stronger developer also works quicker than the diluted one.

The pyrocatechin-soda-developer we also supply ready for use in concentrated form in two solutions under the name of Elconal (name registered). Diluted accordingly this developer is very much recommended for bromide paper.

Above we have pointed out the advantages connected with the use of pyrocatechin in the developer. Now, a short time ago Mr. P. Hanneke discovered that pyrocatechin has a particular property not possessed by any other developer, which secures this product a first position amongst the alkaline developers.

It has always been considered a deficiency of the usual photographic process that the picture produced by the developer does not immediately stand the light, which quality it only obtains by the fixing process following that of developing, and for a long time exertions have been made to simplify the photographic process by combining the developing and fixing processes into one operation.

A simple and perfect solution of this problem was obtained with the aid of Vogel's pyrocatechin-alkali-developer. Of a developer containing

Sulphite of soda, crystallized	30 grams
Water	75 c.c.
Caustic potash (purified, in sticks	7 grams
Pyrocatechin	7 grams

mix for a normally fixing plate of 13 x 18 c.m. (5 x 7 inches)

Developer	12 c c.
Fixing-soda-solution (1 : 5)	20 c.c.
Water	30 c.c.

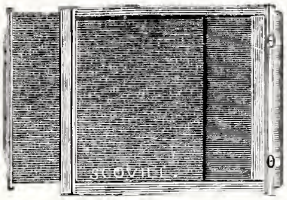
The process of developing and fixing with this solution is accomplished in a few minutes. The picture first appears as usually strengthens very quickly, and shortly after the fixing is entirely done.

It is to be mentioned that the time of exposing the plates is the same as for the usual separated process of developing and fixing. The development takes place quite uniformly. The solution once used for developing and fixing can be used also for a second time without the process being much slower.

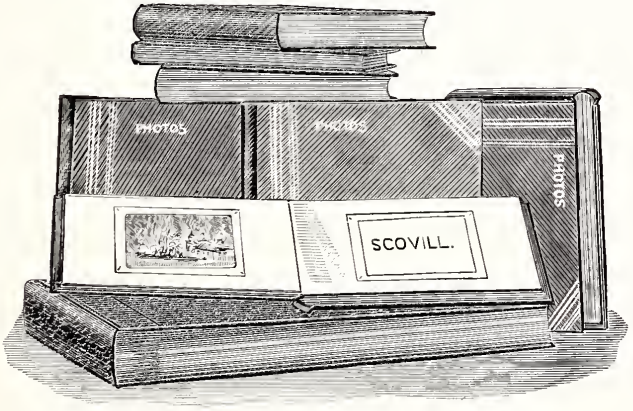
Great over-exposure can be remedied by the employment of much water with the addition of bromide of potassium or by the employment of a developer which has been used before. In cases of too little exposure the fixing developer brings everything out as much as possible, without fear of obtaining hard, too strongly covered negatives. Besides the fixing developer leaves pretty much play in exposing.

Another improvement is in the direction of a double dry plate holder, which we must mention incidentally, is the holder with which the Sologragh camera will be fitted hereafter. The manufacturer's circular of this holder advanced the following claims :

THE BUTTON SOLOGRAPH HOLDER.



The button Solograph holder is the only safe holder in the market. It is the most simple in construction and the easiest to adjust. The two horizontal end pieces which form the wood frame of the holder slide out so as to allow the plate to fall into the holder without having resort to springs, which necessitate too much handling of the plate. When a plate is handled too much the coated side or film is apt to suffer, so that amateurs will appreciate the advantage of the Solograph holder in that respect. When the plate is in place the end pieces of the holder slide back into position. But the main advantage of the Solograph holder lies in the fact that the plate does not depend on an end spring to hold it in place. All workers with other holders now on the market know that when holders of the spring device are stood on edge (and that must be done in transporting the camera), the spring relaxes and the plate jumps out, so that when the slide is drawn out to make an exposure, it cannot be run in again. Many an amateur has lost his temper over accidents of this kind.



The holder, besides, is constructed with a cut-off device to shut out the light when the slide is drawn out. Most other holders in the market leak light.

Still another novelty is the Velox art albums, which are squeegee albums for inserting unmounted photographs. They are handsomely bound in cloth and well made throughout, and are exceedingly artistic both in shape and design. A good photograph depreciates when placed in a gaudy inartistic album, and the amateur should bear this in mind when selecting the proper album.

IN CLOSING UP, WE WISH TO CALL ATTENTION TO the interior view of Strasbourg Cathedral, reproduced on page 183, which has unique interest as being one of the largest, if not *the* largest interior ever photographed by flash-light, and with moving figures. It is worth examination for its wonderfully complete illumination, with a very short exposure. The exposure was made with the Weiss flash-light system, which was used for the group of members of the Royal Photographic Society. The interior is 35 meters high, by 109 meters deep from the place where the camera stood to the extreme portion included in the view (a meter is rather more than three feet), and was made with a single flash, using seven ounces of mixture, and a small supplementary flash in the extreme distance. The illuminant is aluminium powder in an explosive mixture, which, however, cannot be detonated by percussion or friction. The lamp is simple, but very effective. It is not on the United States market, but will, we believe, be sold by the inventor direct.





By C. H. WHITE

PORTRAIT

STANDARD FORMULAE
AND
USEFUL RECIPES.

THE WET COLLODION PROCESS.

1.—NEGATIVE COLLODION.

Ether	¼ fluid ounce
Absolute alcohol	½ fluid ounce
Pyroxyline	5 gr.
Iodide of ammonium	5 gr.
Bromide of cadmium	2 gr.

2.—FERROTYPE COLLODION (ESTABROOKE'S).

Iodide of ammonium	30 gr.
Iodide of sodium	10 gr.
Iodide of cadmium	20 gr.
Bromide of cadmium	20 gr.
Ether and alcohol (of each)	5 fluid ounces
Pyroxyline, sufficient quantity, say	25 gr.

3.—COLLODION FOR THE REPRODUCTION OF LINE WORK (VOLKMER'S).

Plain Collodion.

Ether	700 C.c.
Alcohol	490 C.c.
Pyroxyline	16 Gm.

Sensitizer.

Chloride of calcium	1.6 Gm.
Iodide of ammonium	4.7 Gm.
Iodide of cadmium	7.8 Gm.
Absolute alcohol	123 C.c.

After being perfectly dissolved, mix.

4.—ENAMEL COLLODION.

Alcohol (.82)	48 fluid ounces
Ether (.72)	84 fluid ounces
Pyroxyline	1 ounce
Castor oil	10 minims

5.—SILVER BATH FOR WET-PLATES.

Nitrate of silver	1 ounce
Distilled water	10 fluid ounces

Iodize and acidulate with nitric acid.

6.—SILVER BATH FOR FERROTYPES (ESTABROOKE'S).

Nitrate of silver	4 ounces
Water	64 fluid ounces
Iodide potassium	2 gr.

Dissolve, sun for three or four hours, filter and acidulate.

7.—DEVELOPER FOR FERROTYPES, BY E. P. GRISHOLD.

Protosulphate of iron and ammonia	4 ounces
Water	64 fluid ounces
Acetic acid, 1.048 (U. S. Ph.)	4 ounces
Yellow rock candy	½ ounce

8.—DEVELOPER FOR WET-PLATES.

Sulphate of iron and ammonia	1 ounce
Acetic acid, 1.048 (U. S. Ph.)	1½ fluid ounces
Water	16 fluid ounces

9.—DEVELOPER FOR HARD NEGATIVES (LINE WORK) WET-PLATES.

Protosulphate of iron	5 Gm.
Water	100 C.c.
Tartaric acid	1 Gm.

10.—Developer for Wet-Plates (Very Intense).

Protosulphate of iron	36 Gm.
Sulphate of copper	12 Gm.
Water	1000 C.c.
Glacial acetic acid, 85 per cent	50 C.c.
Alcohol	40 C.c.

11.—Intensifier for Wet-Plates.

Saturated solution of protosulphate of iron	20 C.c.
Acetic acid, 1.048 (U. S. Ph.)	10 C.c.
Citric acid	5 Gm.
Water	200 Gm.

And silver solution to suit.

12.—Intensifier for Wet-Plates.

Pyrogallic acid	1 Gm.
Citric acid	3 Gm.
Water	80 C.c.

And silver solution to suit.

13.—Intensifier for Line Work, Wet-Plates.

A.—Bromide of potassium	½ ounce
Water	4 ounces
B.—Sulphate of copper	½ ounce
Water	4 ounces

Mix equal parts of A and B, and pour on the film. When perfectly whitened, blacken with solution of nitrate of silver, 30 grains to the ounce.

For greater intensity, use hydrosulphate of ammonia solution, 1 part in 4 parts of water, after the bromide of copper, and thorough washing.

14.—Intensifier for Wet-Plates.

Red prussiate of potash	2 drachms
Nitrate of lead	3 drachms
Water	12 ounces

Immerse the fixed negative till thoroughly whitened; wash, and flood with solution of hydrosulphate of ammonia.

15.—To Strip Collodion Negatives.

The best way to do this is to coat the negative, when dry, with a solution of pure rubber in benzole, and afterwards with leather collodion. When perfectly dry, the edges of the negatives may be cut in, and the plate immersed in a diluted acetic acid solution 1 to 10. After a short time the film loosens, and may easily be detached from the plate and turned.

16.—To Rectify a Negative Silver Bath,

Dissolve 1 part of permanganate of potassium in 100 parts of water, and add drop by drop so much of this solution to the bath impregnated with organic matter, till, after vigorously shaking, a slight pinkish color remains.

Sun for several hours, filter and test for neutrality. Acidify with nitric acid.

DRY COLLODION PROCESSES.

17.—Collodio-Bromide Emulsion.

Ether, sp. g. 0.720	5 fluid ounces
Alcohol, sp. g. 0.820	3 fluid ounces
Pyroxyline	50 gr.
Bromide of cadmium and ammonium	80 gr.
(or bromide of zinc 76 gr.)	

Sensitize by adding to each ounce 15 grains of nitrate of silver, dissolved in 1 drachm of boiling alcohol mixed with a few drops of water. This is suitable for slow landscape work or transparencies.

GELATINE DRY-PLATE PROCESSES.

18.—W. K. Burton's Gelatine Emulsion.

A.—Bromide of ammonium ..... 260 gr.
Iodide of potassium ..... 20 gr.
Gelatine (Nelson, No. 1) ..... 80 gr.
Distilled water ..... 10 ounces

B.—Silver nitrate ..... 200 gr.

C.—Silver nitrate ..... 200 gr.
Distilled water ..... 1 ounce

Converted to ammonio-nitrate.

D.—Gelatine, hard (dry) ..... 600 gr.

For detailed directions for making the emulsion, see *Photographic Times*, Vol. XVII., page 285.

19.—Henderson's Gelatine Emulsion by Ammonia Method.

Dissolve

Bromide of ammonium ..... 308 gr.
Gelatine ..... 50 gr.

Previously swelled

In distilled water ..... 8½ ounces

When cold, add

Water ..... 1¾ ounces
Alcohol ..... 1¾ fluid ounces
Stronger ammonia (0.900) ..... ½ fluid ounce

Next dissolve by heat

Nitrate of silver ..... 462 gr.
In distilled water ..... 3¾ ounces

and add gradually to the gelatine solution. Ripening for twenty-four hours gives sensitiveness to the emulsion. Add, finally, 220 grains of swelled gelatine.

20.—Dr. J. M. Eder's Gelatine Emulsion with Ammonio-Nitrate of Silver.

In distilled water, 10 ounces, dissolve bromide of potassium, 370 grains; add gelatine, 617 grains, previously swelled in water. In distilled water, 10 ounces, dissolve nitrate of silver, 462 grains.

To this solution, cold, add "stronger ammonia," U.S.P., drop by drop, until the precipitate first formed is redissolved. Add this gradually to the first solution, and place in a water bath at a temperature of 105 deg. Fahr., for 30 to 45 minutes. Then remove the source of heat, and allow the emulsion to cool down gradually to about 75 deg. Fahr., then pour out to set, and proceed as usual.

21.—Gelatino-Bromo-Chloride Emulsion.

Ammonium bromide ..... 65 grains
Ammonium chloride ..... 5 grains
Gelatine ..... 10 grains
Silver nitrate ..... 120 grains
Nitric acid ..... ½ minim
Water ..... 4½ ounces

DEVELOPMENT OF GELATINE EMULSION PLATES.

22.—CARBUTT'S PYRO DEVELOPER.

No. 1. *Pyro Stock Solution.*

300 C.c.	Distilled or ice water	10 ounces
1 Gm.	Oxalic acid	15 gr.
2 Gm.	Bromide potassium	30 gr.

Then add Schering's pyro, 1 ounce (30 grammes), and water to make 16 fluid ounces (480 C.c.).

No. 2. *Stock Soda Solution.*

300 C.c.	Water	10 ounces
60 Gm.	Soda sulphite crystal	2 ounces
60 Gm.	Soda Carb. Crys. (or dry gran. 1 oz)	2 ounces
30 Gm.	Potash Carbonate	1 ounce

Dissolve, and add water to make measure 16 fluid ounces (480 C.c.).

No. 3. *Bromide Solution.*

14 Gm.	Bromide of sodium or potassium	½ ounce
150 C.c.	Water	5 ounces

Pyro Developer.—Dilute 2 ounces of stock No. 2 with 7 ounces of water for cold weather, and 10 to 12 of water in summer. To 3 ounces of dilute No. 2 add 1½ to 2½ drachms (6 to 10 C.c.) of No. 1. The more pyro the denser the negative, and *vice versa.* No yellowing or fogging need be apprehended if our directions are followed. Development should be continued until the image seems almost buried, then wash and place in fixing bath.

For instantaneous exposures, take for a 5 x 8 or 6½ x 8½ plate 3 ounces of dilute No. 2. Lay the plate to soak in this, and cover pan. Put 2 drachms of No. 1 into the graduate, and 3 drops of bromide solution. Pour the soda solution off of the plate into the pyro and back over the plate; let development proceed, and examine occasionally. Keep solution in gentle motion over the plate. A *very* short exposure may take ten minutes to fully develop. If the image is not fully brought out this time, add to developer in pan three times its bulk of water, and let plate lie in it covered over half an hour or more if necessary, until full development is attained; then wash, and proceed as directed under head of developer.

23.—EIKONOGEN AND HYDROCHINON DEVELOPER (FOR CARBUTT'S ORTHOCHROMATIC PLATES, "CELLULOID" FILMS AND TRANSPARENCIES).

Metric Weight.	A.	Avoirdupois Weight.
600 C.c.	Distilled water	20 ounces
120 Gm.	Sulphite of soda crystals	4 ounces
22 Gm.	Eikonogen	330 gr.
10½ Gm.	Hydrochinon	160 gr.
960 C.c.	Water to make up to	32 ounces

Metric Weight.	B.	Avoirdupois Weight.
600 C.c.	Distilled water	20 ounces
60 Gm.	Carbonate of Potash	2 ounces
60 Gm.	Carbonate soda crystals	2 ounces
960 C.c.	Water to make up to	32 ounces

Developer.—For instantaneous exposures, take (30 C.c.) 1 ounce A, (30 C.c.) 1 ounce B, (120 C.c.) 4 ounces water; for portraits, take (30 C.c.) 1 ounce A, (30 C.c.) 1 ounce B, (150 C c.) 5 ounces water; for landscapes, full exposures, sens. 20-27, take (30 C.c.) 1 ounce A, (15 C.c.) ½ ounce B, (90 C.c.) 3 ounces water; for landscapes, full exposures, sens. 16-20, take

(30 C.c.) 1 ounce A, (25 C.c.) ¾ ounce B, (120 C.c.) 4 ounces water; for lantern slides, full exposures, take (30 C.c.) 1 ounce A, (25 C.c.) ¾ ounce B, (120 C.c.) 4 ounces water, and 2 to 6 drops Restrainer (Solution 3 in Formula No. 22) to each ounce of developer.

NOTE.—More of A will increase density, more of B will increase detail and softness. Temperature of developer should not vary much below 65 degs. nor above 75 degs. The after-treatment is the same as with any other developer.

24.—CARBUTT'S NEW ACID FIXING AND CLEARING BATH.

4 C.c.	Sulphuric acid	1 fluid drachm
480 Gm.	Hyposulphite of soda	16 ounces
60 Gm.	Sulphite of soda	2 ounces
30 Gm.	*Chrome alum	1 ounce
1920 C.c.	Warm water	64 ounces

Dissolve the hyposulphite of soda in 48 ounces (1440 C.c.) of water, the sulphite of soda in 6 ounces (180 C.c.) of water, mix the sulphuric acid with 2 ounces (60 C.c.) of water, and pour slowly into the sulphite soda solution, and add to the hyposulphite; then dissolve the chrome alum in 8 ounces (240 C.c.) of water and add to the bulk of solution, and the bath is ready. This fixing bath will not discolor until after long usage, and both clears up the shadows of the negative and hardens the film at the same time.

After negative is cleared of all appearance of silver bromide, wash in running water for not less than half an hour to free from any trace of hypo solution. Swab the surface with wad of wet cotton, rinse, and place in rack to dry spontaneously.

25.—CARBUTT'S CLEARING SOLUTION TO REMOVE YELLOW STAIN CAUSED BY DEVELOPER.

600 C.c.	Water	20 ounces
90 Gm.	Sulphate of iron	3 ounces
30 C.c.	Sulphuric acid	1 ounce
30 Gm.	Alum	1 ounce

If, after developing and fixing your negative, it is found to be stained yellow from the pyro or hydrochinon developer, first wash well to remove all hyposulphite, then immerse in above solution until the stain is removed; again wash well, and dry.

N. B.—It will improve lantern slides to immerse them for a few minutes in the clearing solution after being well freed from hyposulphite.

26.—CARBUTT'S INTENSIFYING SOLUTION.

Intensification.—With correct exposure and development, intensification need never be resorted to. The following formula is, however, very effective, and the most permanent of all methods:

No. 1.

16 Gm.	Bichlor. mercury	240 gr.
16 Gm.	Chloride ammonium	240 gr.
600 C.c.	Distilled water	20 ounces

No. 2.

16 Gm.	Chloride ammonium	240 gr.
600 C.c.	Water	20 ounces

* N. B.—During cold weather use only half the quantity of chrome alum in above.

No. 3.—Cyanide-Silver Solution.

180 C.c.	Distilled water	6 ounces
4 Gm.	Cyanide potass., C. P.	60 gr.
60 C.c.	Distilled water	2 ounces
4 Gm.	Nitrate of silver	60 gr.

Pour the silver into the cyanide solution while stirring, and mark bottle *poison.*

Let the plate to be intensified wash for at least half an hour, then lay in a 5 per cent. solution of alum for ten minutes, and again wash thoroughly; this is to insure the perfect elimination of the hypo. The least trace of yellowness after intensifying shows that the washing was not sufficient.

Flow sufficient of No. 1 over the negative to cover it, and allow to either partially or entirely whiten; *the longer it is allowed to act*, the *more intense* will be the result; pour off into the sink, rinse, and flow over No. 2, and allow to act one minute; wash off, and pour over or immerse in No. 3 until changed entirely to a dark brown or black. No. 3 can be returned to its bottle, but Nos. 1 and 2 had better be thrown away. Wash thorougly and dry.

27.—WUESTNER'S DEVELOPERS FOR NEW EAGLE LIGHTNING, NEW ORTHOCHROMATIC AND IMPERIAL NON-HALATION PLATES.

Developing Formula.—These plates can be successfully worked with any good developer. For producing the finest negatives, with shortest possible exposure, we recommend the following "sal soda" developer:

No. 1. Pyro Stock Solution.

Water	84 ounces
Sulphite soda crystals	16 ounces
Pyrogallic acid	2 ounces
Sulphuric acid, C. P.	10 drops

No. 2. Soda Stock Solution.

Water	84 ounces
Sal soda (crystals)	8 ounces

Developer.—Take 2 ounces of No. 1, and 2 ounces of No. 2, and add 8 ounces of water.

This developer may be used repeatedly as long as it remains clear, but will work slower and with more intensity when old. Therefore the fresh developer is best for short exposures, and the old is better if the plate has been full timed. In using the sal soda developer, *it is very important, to carry the development far enough, until the lights have sufficient intensity when examining the plate by transmitted light.*

Over-exposure is corrected by adding to each ounce of developer from 2 to 4 drops of the following solution: Bromide of ammonium, 1 ounce to 10 ounces of water; or by putting the plate into a weak solution of bromide of ammonium (1 to 50 water), before the development has proceeded too far, and then returning it to the developer, to gain sufficient intensity.

If under-exposure is noticed, take the plate out of developer, and, without draining, put into "soda solution"; sufficient developer will remain in the film to develop the shadows, the lights being prevented from gaining too much density in this way.

28.—WUESTNER'S EIKONOGEN DEVELOPER FOR PORTRAITS AND LANDSCAPES.

No. 1.

2400 C.c.	Distilled or ice water	80 ounces
105 Gm.	Sulphite of soda (crystals)	3½ ounces
4 Gm.	Oxalic acid	1 drachm
75 Gm.	Eikonogen	2½ ounces
15 Gm.	Yellow prussiate of potash	½ ounce

No. 2.

600 C.c.	Distilled or ice water	20 ounces
60 Gm.	Carbonate of potash	2 ounces

Developer.—Take 4 ounces of No. 1 and ½ ounce of No. 2.

For instantaneous exposures, we recommend the following eikonogen developer:

Dissolve in

300 C.c.	Distilled or ice water	10 ounces
20 Gm.	Sulphite of soda crystals	⅔ ounce
10 Gm.	Carbonate of potash	⅓ ounce

And then add

10 Gm.	Eikonogen	⅓ ounce

Fixing Bath.

Water	100 parts
Sulphite soda (crystals)	5 parts
Sulphuric acid, C. P.	1 part

And add

Hyposulphite of soda	20 parts

This fixing bath cannot be excelled; you will always get a clear and brilliant negative, no yellow stains, a good printing color, and the plate will fix in considerably less time.

After fixing, place the negative in a dish containing a 10 per cent. chrome alum solution; let it remain a few minutes to harden the film, then wash thoroughly.

In tropical climates, we recommend putting the plates in the alum solution before fixing.

29.—Wuestner's Amidol Developer.

1000 C.c.	Water	34 ounces
60 Gm.	Sulphite of soda (crystals)	2 ounces
1 Gm.	Bromide of ammonium	15 gr.

Dissolve, and add 4 to 6 grains (from 1 to 1½ drachms) amidol just before using.

For instantaneous exposures, take double the quantity of sulphite of soda (crystals) 120 grammes (4 ounces).

It is advisable to put this developer up in small quantities.

30.—Direction for Working the Cramer Plate.

Eikonogen Developer.

No. 1.

Metric Weights and Measures.			Troy Weight.
1200 C.c.	Distilled water	Hydrometer test 15.	40 ounces
60 Gm.	Sulphite of sodium crystals		2 ounces
30 Gm.	Eikonogen		1 ounce

Boil for a few minutes. After cooling, pour into a bottle and keep it well stoppered.

No. 2.

300 C.c.	Water	10 ounces
30 Gm.	Carbonate of potassium	1 ounce

For Use.

90 C.c.	Solution No. 1	3 ounces
30 C.c.	Solution No. 2	1 ounce

In hot weather, dilute with an equal quantity of cold water. This developer can be used repeatedly by occasionally adding more of Solution No. 1 and 2.

To obtain thin negatives, full of detail, such as are required for printing on Aristo Paper, use the developer more diluted.

For negatives of greater density, add to solution No. 1:

4 Gm.	Hydrochinon	60 grains

Pyro Developer.

Alkaline Solution.

1800 C.c.	Water	60 ounces
150 Gm.	Carbonate of sodium crystals (sal soda)	5 ounces
300 Gm.	Sulphite of sodium crystals	10 ounces

A smaller quantity of sulphite will produce a warmer tone, a larger quantity a gray or bluish-black tone.

The alkaline solution must be kept in well-stoppered bottles.

If the negatives show yellow stain, make a fresh solution, or try another lot of sulphite of sodium.

Pyro Solution.

180 C.c.	Distilled or pure ice water	6 ounces
1 C.c.	Sulphuric acid	15 minims
4 Gm.	Sulphite of sodium crystals	1 drachm
30 Gm.	Pyrogallic acid	1 ounce

All pyro solutions work best while fresh.

8 grains dry pyro may be substituted for 1 drachm of this solution.

Mix in the following proportions:

10 C.c.	Pyro solution	1 drachm
80 C.c.	Alkaline solution	1 ounce
160 C.c.	Tepid water (for winter use)	2 ounces
	or,	
240 to 400 C.c.	Cold water (for summer use)	3 to 5 ounces

Fixing Bath.—The negatives may be fixed in a plain hypo bath, 1 part hyposulphite of soda to 4 parts of water; but the following bath is especially recommended.

Prepare two solutions.

No. 1.

1 kilo	Hyposulphite of soda	32 ounces
3 liter	Water	3 quarts=102 fluid ounces

No. 2.

1 liter	Water	1 quart=34 fluid ounces
15 C.c.	Sulphuric acid	½ ounce
120 Gm.	Sulphite of sodium crystals	4 ounces
90 Gm.	Chrome alum	3 ounces

After the ingredients are dissolved, pour No. 2 solution into No. 1.

During the cold season, one-half the quantity of No. 2 is sufficient.

Cramer's Isochromatic Plates are developed and fixed with the same solutions.

31.—Potash Developer for "Harvard" Dry-Plates.

A.—Distilled water		12 ounces
	Sulphite of soda (crystals)	2 ounces
	Citric acid	60 gr.
	Bromide of ammonium	25 gr.
	Pyrogallic acid	1 ounce

Dissolve separately, mix in order named and filter.

B.—Distilled water		12 ounces
	Sulphite of soda (crystals)	2 ounces
	Carbonate of potash	4 ounces

Dissolve separately, mix and filter.

The stock solutions must be kept in well stoppered bottles. The pyro stock solution will remain clear and in good order for about a month. It should not be used after it has turned dark and muddy from age.

To develop, mix A, 1 drachm; B, 1 drachm; water, 2 ounces. For detail, add more water; for contrast, more A; for density, more of each, A and B. For instantaneous or short exposures, use double the quantity of water (4 ounces) to begin with; pour off when about half developed, and finish with developer, full strength.

After development, and before fixing, it is well to flow the negative with a saturated solution of alum. Rinse, and fix in the following solution :

Hyposulphite of soda	16 ounces
Water	32 fluid ounces

Many prefer to add alum to the fixing solution (about 1 ounce to the above), to which there is no serious objection, provided, always, it is filtered occasionally.

THE "SEED" PLATE.

32.—PYRO DEVELOPER.

No. 1.

Pyrogallic acid	1 ounce
Sulphite of soda (crystals)	4 ounces
Water, distilled or good well water	16 ounces

No. 2.

Sal soda	4 ounces
Water	16 ounces

To develop, take

No. 1	1 ounce
No. 2	1 ounce
Water	8 ounces

In warm weather, use more water ; in cold weather, less.

Where Aristo Paper is used, the negative must be much thinner and fuller of detail than is required for albumen paper ; therefore, take

No. 1	1 ounce
No. 2	1½ ounces
Water	10 ounces

33.—PYRO DEVELOPER BY USE OF HYDROMETER.

Make stock solution of sulphite of soda to test 60 with hydrometer; allow to settle perfectly clear, then take

Sulphite of soda solution	16 ounces
Pyro	1 ounce
Sulphuric acid	10 drops
(Or oxalic acid, 10 gr.)	

No. 2.

Sal soda solution, hydrometer test 40.

To develop, take

Water	8 ounces
No. 1	1 ounce
No. 2	1 ounce

In warm weather, use more water ; in cold weather, less.

Where Aristo Paper is used, the negative must be much thinner and fuller of detail than is required for albumen paper ; therefore, take

No. 1	1 ounce
No. 2	1½ ounces
Water	10 ounces

34.—EIKONOGEN DEVELOPER—NO. I.

No. 1.

Sulphite of soda (crystals)	3 ounces
Hot water	45 ounces

Thoroughly dissolve, then add

Eikonogen	1 ounce

No. 2.

Sal soda	4 ounces
(Or carb. of potassium, 1¼ ounces.)	
Water	15 ounces

To develop, take of

No. 1	3 ounces
No. 2	1 ounce

Fixing Bath.

Alum	¼ ounce
Hyposulphite of soda	5 ounces
Water	16 ounces

35.—Eikonogen Developer. (In one solution, for instantaneous work.)

Eikonogen	120 grains
Crystallized sulphite of sodium	1½ ounces

Dissolve in 8 ounces of hot water and add carbonate of potassium 120 grains.

For use, dilute with an equal bulk of water, and add a few drops of a 10 per cent. solution of bromide of potassium.

36.—Para-amidophenol Developer.

Para-amidophenol hydrochlorate	150 gr.
Sulphite sodium in crystals (Andresen's)	1½ ounces
Potassium carbonate	1½ drachms
Water	32 ounces

May be diluted in the proportion of from 1:8 to 1:12.

37.—Rodinal.

Metabisulphite of potassium	30 Gm.
Para-amidophenol hydrochlorate	10 Gm.
Potassium hydrate	To neutralization
Water	100 Gm.

This developer permits to be diluted in the proportion of 1:40.

38.—Metol Developer (Hauff).

Solution A.

Water	100 parts
Metol	1 part
Soda sulphite	10 parts

Solution B.

Water	100 parts
Carbonate potash	10 parts
Crystallized carbonate soda	20 parts

For use, three parts A to one of B, with 40 minims of bromide of potassium solution (1 : 10).

39.—Metol Developer (Andresen).

One Solution.

Water	1 quart
Metol	¾ ounce
Sulphite of soda	7 ounces
Carbonate of potash	3½ ounces
Bromide of potassium	½ ounce

Two Solution.

A.—Water	1 quart
Metol	¾ ounce
Sulphite of soda	7 ounces
B.—Water	3 quarts
Carbonate of soda	7 ounces

Of these, one part of A is mixed with three parts of water for use, bromide of potassium being added as required for the prevention of fogging.

40.—Amidol Developer.

Dissolve 10 ounces of neutral sodium sulphite in crystals (Andresen's) in 50 ounces of distilled water, and add 1 ounce of amidol. Dissolve, filter quickly, and fill up in small bottles.

For use, dilute with from 2 to 4 volumes of water.

Do not spare bromide of potassium.

41.—Dr. Stolze's Amidol Developer.

A.—Distilled water ..... 100 Gm.
Potassium metabisulphite ..... 25 Gm.
Amidol (Andresen's) ..... 5 Gm.

B.—Distilled water ..... 100 Gm.
Potassium bicarbonate ..... 20 Gm.

To 100 C.c. of water add 10 C.c. of A, and of B from 5 to 50 C.c., according to time of exposure. For normal exposures, 20 C.c. are sufficient.

Do not apply the solution till effervescence has ceased.

42.—Crystallos.

Sodium sulphite cryst. ..... 8 ounces
Ferrocyanide potassium ..... 2½ ounces
Hydrochinon ..... 1½ ounces
Caustic potash solution (75 per cent) ..... 2 ounces
Distilled water ..... 28 ounces

Dissolve the first three substances in 20 ounces of water, then add the caustic potash solution, finally, the rest of the water. The Paris crystallos is tinted red with aniline dye, which serves to destroy the action of light while developing.

Dilute the solution with from 1 to 5 and 8 volumes of water.

43.—Glycin Developer.

Sodium sulphite ..... 40 grains
Glycin ..... 20 grains
Potassium carbonate ..... 80 grains
Water ..... 4 ounces

44.—Potash Developer for Gelatine Dry-Plates (Dr. Stolze's).

Modified by Dr. Eder.

A.—Carbonate of potassium ..... 90 Gm.
Sulphite of sodium, cryst ..... 25 Gm.
Water ..... 200 C.c.

B.—Water ..... 100 C.c.
Sulphite of sodium, cryst ..... 25 Gm.
Pyrogallol ..... 12 Gm.

Mix 40 minims of A with 50 minims of B and 100 C.c. of water.

Bromide of potassium should be used only in minimal quantities, 1 to 3 minims (of a 10 per cent. solution); with more, the general sensitiveness is much reduced.

An alum bath mixed with an equal volume of saturated sulphate of iron solution increases the density, and gives the plate a good printing quality.

45.—Soda Developer in One Solution for Gelatine Dry-Plates (Eder's Formula).

Crystallized sulphite of sodium ..... 5 drachms
Carbonate of sodium ..... 2½ drachms

Dissolve in 2 ounces of boiled distilled water, and, after having cooled down, add 46 grains of pyro. Keep in well-stoppered bottles, and for use dilute with five times its bulk of water.

46.—Ferrous-Oxalate Developer for Gelatine Dry-Plates (Dr. Eder's).

A.—Neutral oxalate potassium ..... 200 Gm.
Distilled water ..... 800 C.c.

Acidulate with oxalic acid.

B.—Protosulphate of iron, cryst. ..... 100 Gm.
Distilled water ..... 300 C.c.
Sulphuric acid ..... 5 minims

C.—Bromide of potassium ..... 10 Gm.
Distilled water ..... 100 C.c.
D.—Hyposulphite of sodium ..... 2 Gm.
Distilled water ..... 200 C.c.

Mix immediately before use 3 volumes of A with 1 volume of B, and develop. Restrain with a few drops of C.

For over-exposure, take less of the iron solution and add gradually in small portions, as required. To give the negative body, use C.

To make soft negatives with fine detail, take of

A ..... 250 C.c.
B ..... 50 C.c.
C ..... 40 minims
D ..... 16 minims

Plates giving with ordinary developer hard and glassy negatives, give with this modification, very satisfactory results.

47.—Pyro Developer, with Ammonia.

A.—Bromide ammonium ..... ¼ ounce
Water ..... 8 ounces
B.—Stronger ammonia (0.900) ..... 1 ounce
Water ..... 7 ounces
C.—Pyrogallol ..... 1 drachm
Nitric acid ..... 5 minims
Water ..... 12 ounces

Take for correct exposure of A 40 minims, of B 20 minims, of C ½ ounce, and 2 ounces of water.

48.—Pyro Developer, with Carbonate of Sodium.

A.—Dissolve 2 ounces of granulated sulphite of sodium and ¼ ounce of meta-bisulphite of potassium in 32 ounces of distilled water, and add 1 ounce of pyrogallic acid.

Keep in well-stoppered bottles.

B.—Dissolve 8 ounces of granulated, or 16 ounces of crystallized, carbonate of sodium (common washing soda), in water enough to make a bulk of 32 ounces.

Mix 1 ounce of water with 1 drachm of A, add a few drops of B, and increase gradually till development proceeds regularly. If necessary, restrain with 10 per cent. solution of bromide of potassium.

49.—Pyro Developer, with Carbonate of Potassium.

A.—Pyro ..... 1 ounce
Sulphite of sodium, granulated ..... 2 ounces
Bromide of potassium ..... 80 gr.
Citric acid ..... 60 gr.
Water ..... 12 ounces
B.—Water ..... 12 ounces
Sulphite of sodium, granulated ..... 1 ounce
Carbonate of potash ..... 3 ounces

1 drachm of each—A and B—to 1 ounce of water, make the developing solution.

50.—Hydrochinon Developer.

A.—Hydrochinon ..... ¼ ounce
Sulphite of sodium, granulated ..... 1 ounce
Meta-bisulphate of potassium ..... 30 gr.
Water ..... 16 ounces
B.—Carbonate of potassium ..... 1½ ounces
Water ..... 16 ounces

51.—Hydrochinon Developer in One Solution.

Hydrochinon ..... ½ ounce
Sodium sulphite, granulated ..... 2 ounces
Potassium carbonate ..... 2 ounces
Water ..... 32 ounces

For use, dilute 1 volume with 3 volumes of water.

52.—The Acid Fixing and Clearing Bath.

Add 2 ounces of S. P. C. Clarifier (acid bisulphite of sodium) solution to 1 quart of hypo solution 1 in 5.

53.—Combined Alum and Hypo Bath.

Add saturated solution of sulphite of sodium to saturated solution of alum till the white precipitate formed remains undissolved, and when the odor of sulphurous acid becomes perceptible.

Mix this solution with an equal bulk of freshly-prepared hypo solution 1 in 5, and filter.

This bath will remain clear.

54.—Clearing Solution (Edward's).

Alum	1 ounce avoirdupois
Citric acid	1 ounce "
Sulphate of iron, crystals	3 ounces "
Water	1 Imperial pint

This should be freshly mixed.

55.—Clearing Solution.

Saturated solution of alum	20 ounces
Hydrochloric acid	1 ounce

Immerse negative after fixing and washing. Wash well after removal.

56.—Belitzki's Method for Removing the Last Traces of Hypo.

Chloride of Lime	20 Gm.
Water	1 liter

Add to the milky liquid

Sulphate of zinc	40 Gm.

dissolved in from 80 to 100 C.c. of water; shake well and decant.

The clear, supernatant solution of hypochlorite of zinc is kept in well-closed bottles; 1 part of it mixed with 60 parts of water will remove the last traces of fixing soda.

The solution remains active as long as it smells of hypochlorous acid.

57.—To Remove Hypo from Films.

A solution of bromine in water, about 1 in 30, destroys the hypo in a gelatine film.

58.—Intensifier, with Mercury and Ammonia, for Gelatine Dry-Plates.

Pour over the well-washed negative a saturated solution of mercuric chloride (bichloride of mercury); do not keep it on too long, unless the negative is very thin. Wash well, and immerse in bath of

Water	10 ounces
Ammonia	10 minims

Leave the plate in this solution until the black color goes quite through the film. Wash well.

59.—Intensifier (Mercuric) with Sodium Sulphite, for Gelatine Dry-Plates.

Whiten the negative in the saturated solution of mercuric chloride, wash and blacken with a solution of sulphite of sodium 1 in 5. Wash well.

The reduction is perfect, with a positive black tone.

60.—Intensifier with Iodide of Mercury.

Dissolve 1 drachm of bichloride of mercury in 7 ounces of water and 3 drachms of iodide of potassium in 3 ounces of water, and pour the iodide solution into the mercury till the red precipitate formed is completely dissolved.

For use, dilute with water, flow over the negative till the proper density is reached, and wash, when the deposit will turn yellow. Remove the yellow color by flowing a 5 per cent. solution of hypo over the plate, and give it the final washing.

61.—Intensifier for Gelatine Dry-Plates with Mercuric Chloride and Hydrochinon (Dr. Mallman).

After whitening in the saturated solution of mercuric chloride, as usual, treat with an old hydrochinon developer; the result is a bluish-black intensification, which is applicable to positives as well as negatives.

62.—Reducer for Gelatine Dry-Plate Negatives (Farmer's).

Sat. sol. of ferricyanide of potassium	1 part
Hyposulphite of sodium solution, 1 in 10	10 parts

63.—Reducer for Gelatine Dry-Plates.

Perchloride of iron	30 gr.
Citric acid	60 gr.
Water	1 pint

64.—Belitski's Acid Ferric-Oxalate Reducer for Gelatine Plates.

Water	7 ounces
Potassium ferric oxalate	2½ drachms
Crystallized neutral sulphite of sodium	2 drachms
Powdered oxalic acid, from 30 to 45	gr.
Hyposulphite of soda	1½ ounces

The solution must be made in this order, filtered, and be kept in tightly-closed bottles; and as under the influence of light the ferric salt is reduced to ferrous, the preparation must be kept in subdued light, in non-actinic glass bottles.

65.—To Reduce Intensity of Negatives.

Rub the parts to be reduced with a soft rag moistened with alcohol, till the density is softened down. For sharply defined outlines, use a pointed stick of soft wood dipped in alcohol.

The method may be well applied for the brightening up of flare spots and halation marks.

ORTHOCHROMATIC METHODS BY BATHING.

66.—Orthochromatic Dry-Plates—F. Ives' Chlorophyll and Eosine Process.

Use any good bromide collodion emulsion that contains no free nitrate of silver. Flow plate as usual, and as soon as the emulsion film sets, flow several times with strong alcoholic solution of chlorophyll from blue myrtle, or plantain leaves; then immerse in water strongly tinted with blue shade eosine, and keep in motion until smooth.

Sensitizes for all colors, including deep ruby red; a very light-yellow screen is sufficient to secure correct rendering of color-tone.

67.—Orthochromatic Dry-Plates—V. Schumann's Cyanine Bath.

Soak the plate in 200 C.c. of water and 2 to 4 C.c. of stronger ammonia for two or three minutes, then immerse in

Distilled water	200 C.c.
Alcohol	10 C.c.
Stronger ammonia (0.900)	4 C.c.
Alcoholic solution of cyanine, 1 in 500	10 C.c.

68.—Orthochromatic Dry-Plates—Erythrosine Bath (Mallmann and Scolik).

Preliminary Bath.

A.—Water	200 C.c.
Stronger ammonia	2 C.c.

Soak the plate for two minutes.

Color Bath.

Erythrosine solution, 1 in 1000	25 C.c.
Stronger ammonia (0.900)	4 C.c.
Water	175 C.c.

The plate should not remain longer in this bath than one and a quarter minutes.

69.—Obernetter's Method with Nitrate of Silver.

Distilled water	480	C.c. = 16	fluid ounces
Nitrate of silver	1.25	Gr. = 20	gr.
Ammonium carbonate	5	Gr. = 75	gr.
Erythrosine solution (1 in 500)	35	C.c. = 1⅛	fluid ounces
Stronger ammonia (0.900)	4	C.c. = 1	drachm

Bathe the plate in the preliminary solution (see No. 68) for 150 seconds. Without washing flow the sensitizing solution over the plate twice, and dry in the dark closet.

70.—To Prepare Yellow Glass Screens.

Take of crushed (not powdered) curcuma root, 2 ounces, and macerate in 10 ounces of alcohol for three days. After filtering the tincture, mix with an equal bulk of ether, and add to each ounce of the mixture 6 grains of gun cotton.

With this collodion coat a plane parallel glass plate, which must be perfectly white, thin, and without any curvature.

VARNISHES.

71.—Negative Varnishes.

Sandarac	4 ounces
Alcohol	24 ounces
Oil of lavender	3 ounces
Chloroform	5 drachms

72.—Negative Varnish.

White hard shellac varnish	15 ounces
Alcohol	25 ounces

This will be found a good and cheap varnish if durability is not required, as it is easily rubbed up for retouching upon and easily cleaned off. Very suitable for enlarged negatives that are not to be retained.

73.—NEGATIVE VARNISH.

Tough, hard and durable.

Shellac	1¼ ounces
Mastic	¼ ounce
Oil of turpentine	¼ ounce
Sandarac	2¼ ounces
Venice turpentine	¼ ounce
Camphor	20 gr.
Alcohol	20 fluid ounces

74.—NEGATIVE VARNISH.

Sandarac	90 ounces
Venice turpentine	36 ounces
Oil of lavender	10 ounces
Alcohol	500 fluid ounces

75.—STANDARD PHOTOGRAPHIC VARNISH.

White shellac	8 ounces
Orange shellac	4 ounces
Sandarac	1 ounce
Alcohol	60 fluid ounces

76.—RETOUCHING MEDIUM.

Dammar	70 gr.
Yellow resin	6 drachms
Oil of turpentine	4 ounces

77.—NEGATIVE RETOUCHING VARNISH.

Sandarac	1 ounce
Castor oil	80 gr.
Alcohol	6 fluid ounces

First dissolve the sandarac in the alcohol, and then add the oil.

78.—GROUND-GLASS VARNISH.

Sandarac	90 gr.
Mastic	20 gr.
Ether	2 fluid ounces
Benzol	½ to 1½ fluid ounces

The proportion of the benzole added determines the nature of the mat obtained.

79.—ENCAUSTIC PASTE.

Pure white wax	500 parts
Elemi	10 parts
Benzol	200 parts
Oil of lavender	300 parts
Oil of spike	15 parts

PRINTING AND TONING ON ALBUMENIZED, PLAIN AND OTHER PAPERS.

80.—THE SILVER PRINTING BATH.

Silver nitrate	50 gr.
Water	1 ounce

Neutralize with carbonate of silver.

81.—MODIFIED SILVER BATH.

Silver nitrate	50 gr.
Ammonium nitrate or magnesium nitrate	50 gr.

To secure a neutral state of the bath, a little carbonate of silver should be kept at the bottom of the stock bottle.

82.—The Price Toning Formula.

Into 7½ ounces of water dissolve 15 grains chloride of gold and sodinm, then add to it 300 grains of acetate of soda and 7 drops of a saturated solution of chloride of lime.

This stock solution should be prepared at least twenty-four hours before being used. Take ½ ounce of it and mix with 5 ounces of water.

83.—The Photographic Times Toning Bath.

Into 7½ ounces of water put 7½ grains chloride of gold and sodium. Label the bottle containing the mixture: *Chloride of gold solution.* Combine 6 ounces of water with 1 ounce *of French azotate,* to which add 1½ ounces of the chloride of gold solution.

84.—Borax Toning Bath.

Chloride of gold solution, 1:50	3 C.c.
Borax solution, 1 to 10	100 C.c.
Water	100 C.c.

Can be used immediately.

85.—Charles W. Hearn's Toning Baths.

With Sal Soda.

Distilled water	64 fluid ounces
Acid sol. of chloride of gold (4 grains to 1 ounce)	1 fluid ounce
Saturated solution of carbonate of sodium cryst.	½ fluid ounce

Should be prepared half an hour before use.

With Chloride of Lime.

Water	40 ounces
Chloride of lime	5 gr.
Chloride of gold	4 gr.

86.—Abney and Robinson's Toning Baths.

Chloride of gold	1 gr.
Sodium carbonate	10 gr.
Water	10 ounces

Should be used immediately after mixing. This bath gives purple and black tones.

87.—With Chalk and Chloride of Lime.

Chloride of gold	2 gr.
Saturated sol. of chloride of lime	2 drops
Chalk	1 pinch
Water	16 ounces

The bath should be prepared with hot water, and be kept for one day before using it.

88.—Dr. Liesegang's Toning Bath.

With Tungstate of Sodium.

Tungstate of sodium	20 Gm.
Boiling water	1 liter
Chloride of gold	1 Gm.

89.—Dr. Liesegang's Toning Bath.

With Phosphate of Sodium.

Phosphate of sodium	15 Gm.
Chloride of gold	1 Gm.
Water	1 liter

90.—Dr. Liesegang's Toning Bath.

With Carbonate of Lime (Chalk).

Chloride of gold	1 Gm.
Carbonate of sodium	15 Gm.
Chalk	5 Gm.
Water	1 liter

After twelve hours the bath is perfectly clear and colorless, when it is ready for use. It is very durable, and gives fine tones.

91.—Toning Bath for Ready Sensitized Paper.

A.—Chloride of gold	1 Gm.
Water	1 liter
B.—Borax	10 Gm.
Tungstate of sodium	40 Gm.
Water	1 liter

92.—Printing on Plain Paper.

Prepare the plain paper with

Ammonium chloride	60 to 80 gr.
Sodium citrate	100 gr.
Sodium chloride	20 to 30 gr.
Gelatine	10 gr.
Distilled water	10 ounces

or,

Ammonium chloride	100 gr.
Gelatine	10 gr.
Water	10 ounces

The gelatine is first swelled in cold water and then dissolved in hot water, and the remaining components of the formula are added. The solution is filtered, and when still warm the paper floated upon it for three minutes.

The salted paper is sensitized upon a neutral 45-grain silver bath.

93.—Red Prints for Photo-Engravers.

Citric acid	100 gr.
Ammonium chloride	100 gr.
Gelatine	10 gr.
Water	10 ounces

Dissolve the citric acid in a small portion of water, and exactly neutralize with carbonate of soda (228 grains of common washing soda are required).

Float the paper on this bath for one to two minutes, and sensitize upon a 50-grain nitrate of silver solution. Fix in fresh hypo, without toning.

94.—Platinum Toning Bath, for Plain Silver Prints.

Chloroplatinite of potassium	1 Gm.
Water	1 liter
Nitric acid	5 to 10 drops

95.—Toning Silver Prints After Fixing (Pizzighelli).

Ammonium sulphocyanate	300 Gm.
Gold chloride	3 Gm.
Potassium hydrate	3 Gm.
Water	1000 Gm.

96.—How to Print on Whatman's Drawing Paper.

Salt the paper in

Water.....560 Gm.
Arrowroot (boiled)..... 18 Gm.
Ammonium chloride..... 16 Gm.

by floating. Dry in horizontal position, and sensitize with a

Silver nitrate solution.....60 Gm. to 240 Gm. of water

to which

Citric acid.....25 Gm. in 240 Gm. of water

is added.

Print till a metallic lustre appears in the deeper shadows.

Tone with

Chloroplatinite of potassium..... 4 Gm.
Water.....560 Gm.
Nitric acid .....1 to 2 Gm.

Fix in the ordinary hypo bath made alkaline with a few drops of ammonia.

The resulting tones are of a warm brown, when, adding sodium bisulphite to the hypo, the color will turn to a positive black.

97.—Pizzighelli's Platinum Paper.

1.—Chloroplatinite of potassium..... 10 Gm.
Distilled water..... 60 Gm.
2.—Ferric oxalate..... 20 Gm.
Oxalic acid..... 1.5 Gm.
Water.....100 Gm.
3.—2 per cent. solution of chlorate potassium. ... 0.4 Gm.

For use, mix of

1..... 48 Gm.
2..... 30 Gm.
3..... 8 Gm.
Water..... 8 Gm.

The paper is coated with this solution by means of brusn, sponge or cotton tuft.

Dry quickly without the application of heat, and keep the sensitive paper in a box and free from moisture.

When sufficiently exposed, develop with

Oxalate potassium .....140 Gm.
Water .....500 Gm.

acidified slightly with oxalic acid.

Fix in 1 part of hydrochloric acid and from 60 to 80 of water; finally wash.

The acid fixing bath should be applied three or four times successively.

When adding to the above developer from 1 to 2 Gm. of mercuric chloride, the otherwise black tone will change to an agreeable brown.

ARISTOTYPE OR CHLORIDE OF SILVER COLLODION AND CHLORIDE OF SILVER GELATINE PRINTING

98.—Aristotype, or Chloride of Silver Collodion.

A.—Nitrate of silver..... 8 Gm.
Alcohol .....100 C.c.
B.—Chloride of strontium..... 2 Gm.
Alcohol .....100 C.c.

C.—Citric acid	5 Gm.
Water	100 C.c.
D.—Ether	100 C.c.
Gun cotton	4 Gm.
Alcohol	100 C.c.

To 100 C.c. collodion (D) add first, by constant agitation, 10 C.c. of B and 10 C.c. of C; finally add 5 C.c. of A by vigorously shaking the mixture. The resulting emulsion is allowed to settle for twenty-four hours, and is then used for coating paper.

99.—Chloride of Silver Collodion (Geldmacher's).

Solution 1.

Gun cotton	6½ fluid drachms
Ether	15 fluid ounces
Alcohol	15 fluid ounces
Castor oil	1 drachm

Solution 2.

Nitrate of silver 5 drachms	8 gr.
Water	6 drachms
Alcohol	1½ ounces

Dissolve in a warm water bath.

Solution 3.

Citric acid 1 drachm	15 gr.
dissolved in	
Alcohol	2½ ounces
and	
Chloride of strontium 1 drachm	15 gr.
dissolved in	
Alcohol	2½ ounces

Make the two solutions separately and mix.

After all the solutions have been made, add No. 3 to No. 1, shake vigorously, and by subdued light add gradually, and in small portions at a time, the No. 2 solution by constant agitating.

After an hour's ripening, the collodion emulsion is ready for use.

The paper to be coated must be furnished with a substratum of sulphate of barium and gelatine.

100.—Woodbury's Formula for Gelatine Aristotypes.

Water	8 ounces
Silver nitrate	¼ ounce
Rochelle salts	20 gr.
Ammonium chloride	10 gr.
Alum	50 gr.
Citric acid	1 drachm
Gelatine	1 ounce

Dissolve the gelatine in 6 ounces of water, the silver nitrate and the citric acid in 1 ounce of water, and the salts and alum in another ounce of water; add latter solution to gelatine, and stir well and pour in the silver solution gradually.

101.—Liesegang's Toning Bath for Aristotypes.

A.—Water	20 ounces
Sulphocyanate of ammonium	1 ounce
Alum	1 ounce
Saturated solution of carbonate of ammonium	20 drops
B.—Water	50 ounces
Chloride of gold	15 gr.

102.—A. Stieglitz's Toning Bath for Aristotypes.

1.—Phosphate of sodium	3 drachms
Water	32 ounces
2.—Chloride of gold	15 gr.
Water	16 ounces

Mix. Allow to stand for twenty-four hours.

103.—Liesegang's Combined Toning Bath.

Water	32 ounces
Hyposulphite of sodium	8 ounces
Sulphocyanate of ammonium	1 ounce
Acetate of sodium	½ ounce
Saturated solution of alum	2 ounces

and

Water	8 ounces
Chloride of gold	15 gr.
Chloride of ammonium	30 gr.

Pour the gold solution into the hypo solution, then add 30 grains of freshly prepared chloride of silver.

104.—Combined Fixing and Toning Bath for Chloride of Silver Gelatine Paper.—Dr. F. Stolze's.

Hyposulphite of sodium	35 Gm.
Common salt	9 Gm.
Alum	4 Gm.
Sulphocyanate of ammonium	2 Gm.
Water	150 to 200 C.c.

The compound will have matured for use in four to eight days.

Decant the clear solution from the deposit formed and filter. Immediately before use, add to above quantity, 2 C.c. chloride of gold solution 1 in 100. If the solution does not act with sufficient energy, a few C.c. of saturated alum solution may be added.

105.—Ilo Collodion Paper—Separate Toning Bath.

METRIC WEIGHT.	APOTHECARIES' WEIGHT.
Stock Solution No. 1.	
2000 grammes water.	½ gallon water.
90 grammes acetate soda fused.	3 ozs. acetate soda fused.
Stock Solution No. 2.	
2000 grammes water.	½ gallon water.
30 grammes sulpho cyanide ammonia.	1 oz. sulpho cyanide ammonia.
Stock Solution No. 3.	
1 gramme chloride gold.	15 grains chloride of gold.
250 grammes water.	8 ozs. water.

Mix bath two hours before using, in the following proportions: No. 1, four parts; No. 2, one part, and No. 3, two parts.

Fix in a solution one part hypo to ten parts water.

If the tone is not what you wish, then place the toned and fixed print in an old combined bath, and you can obtain any desired effect.

Another Good Separate Toning Bath.

METRIC WEIGHT.		APOTHECARIES' WEIGHT.	
Boiling water	2000 grammes	Boiling water	½ gallon
Sulpho cyanide ammonia	75 grammes	Sulpho cyanide ammonia	2½ ounces
Citric acid	15 grammes	Citric acid	½ ounce
Alum, powdered	10 grammes	Alum, powdered	⅓ ounce
Phosphate sodium	30 grammes	Phosphate sodium	1 ounce
Chloride of gold	1 gramme	Chloride of gold	15 grains

Add two parts water to one part of this solution; it may be used one hour after mixing, when it has become cold.

Each of these Separate Baths possess good keeping qualities, and may be strengthened each time you use them by adding fresh solution.

The Ilo Combined Bath.

We recommend to those who prepare their own bath, to mix in a six or seven gallon stone jar (with hole near bottom to insert wooden faucet), in order following:

METRIC WEIGHT.		APOTHECARIES' WEIGHT.	
Water	16 liters	Water	4¾ gallons
Acetate of lead, C. P	100 grammes	Acetate of lead, C. P.	5½ ounces
Nitrate of lead, C. P.	160 grammes	Nitrate of lead, C. P.	5½ ounces
Alum, powdered	120 grammes	Alum, powdered	3⅞ ounces
Sulpho cyanide ammo., C.P.	440 grammes	Sulpho cyanide ammo., C. P.	14½ ounces
Citric acid	120 grammes	Citric acid	3⅞ ounces
Hypo	4000 grammes	Hypo	140 ounces
Chloride of gold	6 grammes	Chloride of gold	92 grains

Dissolve thoroughly, let stand to settle and use the clear portion only.

This bath will keep any length of time, but if kept open to the air will evaporate and get stronger; it ought to be prepared in a large jar and then drawn off into bottles.

☞ The Combined Bath must *always* have a great *excess of hypo.* The hypo is constantly decomposed by the chemicals in the *paper* and in the *bath*, and this diminishes the fixing power. An exhausted bath *tones* very quickly, but fixes insufficiently, and yellow stains and green borders around vignettes are the results. Therefore, after every twenty-five cabinets toned, one-half ounce of a saturated solution of hypo must be added to the bath you are *using*.

A quart of this solution will tone 150 cabinet photos with perfect safety, and *when prints are washed previously*, 300 to 350.

It is best to use fresh bath every time, but when using old and new, always take three-quarters new, and *only one-quarter* old bath. Pour the used bath in a separate bottle.

106.—C. E. Hopkins's Omega Papers.

Separate Toning and Fixing for Omega Paper.—Print about the same as albumen paper. Wash through five or six changes of water, having the first two thoroughly alkali.

Have prepared the following solutions:

Borax (saturated solution)	1 to 12	ounces water
Acetate of soda (saturated solution)	1 to 3	ounces water
Hypo soda (saturated solution	1 to 1½	ounces water
Alum (saturated solution)	1 to 10	ounces water

For toning, use gold solution, 1 ounce; water 20 to 60 ounces; borax solution, to make nearly neutral; acetate of soda solution, 2 to 4 drachms.

Tone to nearly the desired tone, and place in plenty of water slightly acidified with acetic acid; rinse well, and fix from fifteen to thirty minutes in hypo solution, 9 to 12 ounces; borax solution, 3 to 6 ounces; liquid acid sulphite of soda, 1 drachm; alum solution, 10 to 20 ounces; water to make 1 gallon. The acid sulphite, added before the alum, prevents any precipitation. Time the fixing according to the depth of printing, tone, etc. If the high lights are clear and the print light enough, and the tone not too warm, take out in fifteen minutes; otherwise, leave in longer and strengthen the bath. The strength of the toning bath should be regulated to suit the strength of the paper, fresh paper toning much easier than old. Toning should occupy about ten minutes, and strength of bath regulated to that time.

Handle prints face down in all of the processes, and keep them moving; wash very thoroughly after fixing; mount, retouch and burnish in the ordinary way. For cleaning the surface of the prints after they are dry, use alcohol and a soft, clean cloth. In cool weather, and prints in ordinary condition, the smaller quantities indicated in the formula are sufficient; but more alum may be required in warm weather, in which case use more borax and hypo also. In case the high lights do not clear up in a reasonable time, the fixing bath should be strengthened.

Combined Bath for Omega Paper.

Hot water	1 gallon
Hypo soda	12 ounces
Borax	1 ounce
Alum	4 ounces

Dissolve thoroughly; place in evaporating dish; heat to near the boiling point (180 degs.); let cool, and filter. For use, to each 32 ounces add 1 drachm of an 8-grain solution acetate of lead, and 1 grain of gold. This ought to tone in about ten to fifteen minutes. If it should tone more rapidly than ten, add more of the stock solution; but if more slowly than fifteen, add a little more gold. Do not wash the prints previous to toning, but place them dry into the bath, one at a time, being careful to manipulate them briskly, and break all air bubbles. Do not place too many prints in the bath at once, and do not try to tone too many in a given quantity of solution. One quart of the bath will tone and fix from forty to fifty cabinets. Do not try more. Throw this away and use fresh. Should the film become soft, rinse through two or three changes of water, and soak them a few minutes in a plain bath of alum, about 4 ounces to the gallon. It is surprising what beautiful tones may be produced by this process—no indication of that "double tone" so common in combined baths. Stop the tone very nearly where you want it, as there is very little change in drying. If there is any inclination to stick to the rubbing-down paper, use a soft, wet sponge.

107.—Combined Toning and Fixing Bath (Ehrmann's).

Dissolve

Hyposulphite of soda	16 ounces

in

Water	31 ounces

Also dissolve

Alum	3 ounces

in

Water	31 ounces

Mix the two solutions and allow to stand for several days in an open jar or vessel till all sulphurous acid has evaporated. Then filter, and add 22 grains of nitrate of lead previously dissolved in water.

To 18 ounces of this solution add 5 grains of pure terchloride of gold dissolved in 2 ounces of water.

The gold solution should be added in small portions at a time, by constant stirring with a glass rod.

Twenty ounces of this bath will tone fifty 5 x 8s of any kind of aristo (chloride of silver emulsion) prints, but not more.

The best results were had upon Bradfisch Improved Aristo Paper.

PRINTING ON SUBSTANCES OTHER THAN PAPER.

108.—COLLODION FOR PORCELAIN PICTURES.

Fennemore's Method.

A.—Negative gun cotton ..... 60 gr.
Alcohol ..... 2 fluid ounces
Ether ..... 3 fluid ounces

Dissolve 120 grains nitrate of silver in 3 ounces of hot alcohol, and add by constant stirring to the above collodion.

B.—Chloride of strontium ..... 32 gr.
Citric acid ..... 24 gr.

Reduce to a fine powder and dissolve in 4 ounces of alcohol, add

Ether ..... 4 fluid ounces
Gun cotton ..... 60 gr.

The two collodions are to be mixed in equal proportions.

109. *Hern's Method.*

A.—Alcohol ..... 7 fluid ounces
Ether ..... 9 ounces
Gun cotton ..... 112 gr.
B.—Nitrate of silver ..... 486 gr.
Distilled water ..... 1 ounce
C.—Chloride of calcium ..... 128 gr.
Alcohol ..... 4 fluid ounces
D.—Citric acid ..... 128 gr.
Alcohol ..... 4 fluid ounces

Decant 8 ounces of A, add 64 drops of B in small portions, stirring up well after every addition, and 4 drachms of C in the same way. Finally 4 drachms of D must be added in the same manner as the calcium solution.

110.—PRINTING ON SILK.

Boiling water ..... 80 ounces
Chloride of ammonium ..... 100 gr.
Iceland moss ..... 60 gr.

When nearly cold, filter and immerse the silk for fifteen minutes. Sensitize for fifteen minutes in an acid 20-grain silver bath, and when dry stretch the fabric over cardboard. Print deeper than usual and tone in

Water ..... 20 ounces
Acetate of sodium ..... 2 drachms
Chloride of gold ..... 3 gr.
Common whiting ..... a few gr.

111.—MAKING SILVER PRINTS ON WOOD.

Gelatine ..... 45 gr.
White soap ..... 45 gr.
Water ..... 5¼ fluid ounces

Soak the gelatine in water for five or six hours, then dissolve it with the aid of a water bath. Cut the soap into small pieces, and add to the gelatine solution, stirring the whole with a glass rod to insure a perfect mixture; then add powdered alum until the froth disappears, and strain through muslin. Cover the block with this mixture and a little zinc white, then wipe off so that a very thin film will be left, rubbing it gently, so that the film may be of as even a thickness as possible. After drying, apply with a badger's-hair brush a coating of the following composition:

Albumen ..... 3¼ fluid ounces
Water ..... 2½ fluid ounces
Chloride of ammonium ..... 67½ gr.
Citric acid ..... 18¾ gr.

Whip the albumen to a froth, and allow it to settle; to the limpid portion add the water, then the sal ammonia, and carefully stir with a glass rod. then add the citric acid. When the block is dry, sensitize with a solution of

Nitrate of silver	187½ gr.
Water	3¼ fluid ounces

Pour this upon the surface of the block, spread it evenly with a glass rod and pour off the excess. When the block is dry, expose it under a negative in the usual manner, until it is printed the exact shade desired. When printed, immerse the printed surface in a very strong solution of salt for about three minutes. Then wash it under a stream of water for a short time, and fix it by placing it face downward in a saturated solution of hyposulphite of soda. After fixing, wash under a stream of water for about ten minutes; when dry, it is finished, and ready for the engraver.

112.—To Transfer Photographs upon Wood for Engraving.

Float the reverse side of sensitized albumen paper for fifteen minutes upon a 4 per cent. solution of bichromate of potassium; dry well; expose to light till the picture is fairly visible; place the print upon a glass plate under water until the unacted on bichromate is dissolved out; after removal from the water, roll in with fatty ink.

When the picture is sufficiently blackened, and nearly dry, it can be transferred upon the engraver's block by rubbing it on carefully.

113.—Cyanotype, or Blue Printing Process.

A.—Citrate of iron and ammonium	1⅞ ounces
Water	8 ounces
B.—Ferricyanide of potassium	1¼ ounces
Water	8 ounces

Mix equal parts immediately before use and float the paper, Rives' plain, upon it for three minutes; hang up to dry.

To Intensify Faint Blue Prints.—Soak them for five minutes in a solution of 1 drachm of ferric chloride in 32 ounces of water, and wash again.

Cyanotype Process—Black Lines upon a White Ground.

Water	9 ounces
Gelatine	3 drachms
Perchloride of iron solution (U. S. Ph.)	6 drachms
Tartaric acid	3 drachms
Ferric sulphate	3 drachms

Filter off any precipitate that may be found and coat any good, stout white paper with the full strength solution. Expose in sunlight till details or lines are visible, and develop with

Gallic acid	6 drachms
Alcohol	6½ ounces
Water	32 ounces

Wash well in several changes of water.

114.—To Tone Bromide of Silver Prints and Diapositives to a Warm Color.

A.—Uranium nitrate	1 Gm.
Water	100 Gm.
B.—Potassium ferricyanate	2 Gm.
Glacial acetic acid	8 Gm.
Water	100 Gm.

Mix immediately before use.

115.—Kallitype Printing (Formula No. 2).

Dissolve 15 Gm. of ferric oxalate in 500 C.c. of water, and 3 Gm. of silver nitrate in 500 C.c. of water. Mix the two solutions, and float the paper upon it for two minutes.

Print till the half shadows of the cliché are out, and develop in

Water	1000 Gm.
Rochelle salts	10 Gm.
Borax	7 Gm.
And of a saturated solution of potassium bichromate	from 2 to 4 drops

The picture is thoroughly developed in fifteen minutes; afterward immerse it in diluted ammonia, 1 : 100; wash and dry.

Potassium bichromate acts here as a restrainer. Too much of it makes the print harsh and chalky, and a longer exposure is required to make a good print.

116.—The Kallitype (*The Photographic Times* Formula).

Coat stout but fine grained paper with a solution of

Sodium ferric-oxalate	6 drachms
Water	2½ ounces

Dry quickly without the application of heat, and print till the deeper shadow portions of the picture become visible. On removal of the print from the frame, immerse into a 1½ per cent. solution of nitrate of silver acidified slightly with citric acid, when the picture will develop brilliantly and with all detail.

Finally wash in pure water. A yellow tinge may be washed away with a 5 per cent solution of oxalic acid.

117.—Formula for Vici (Kallitype) Paper, Hopkins's.

Use this paper when thoroughly dry. Do not print in rainy weather expecting superior results, nor after 4 P.M. expecting black tones. This paper prints but slightly; developing is done afterward.

Print in direct sunlight until deep shadows are well indicated.

Developing may be done in weak white light.

As with Omega paper, the prints when finished will be of a darker color than they appear in the developer. There is no chance in overdeveloping, care only being required in the printing. Do not expose prints in too strong white light until after having taken out of the fixing solution.

Immerse prints one at a time in either of the following solutions, breaking any air bubbles that may appear, until the yellow of the paper entirely disappears. This takes about five minutes.

Develop as soon as possible after removing from printing frame, as they continue to print after once exposed.

Black Tones.

Water	10 ounces
Rochelle salts	1 ounce
Borax	¾ ounce

Sepia Tones.

Water	10 ounces
Rochelle salts	1 ounce
Borax	2 drachms

Dissolve cold, shake well, leave any undissolved borax in bottle, and filter.

Restraining Solution.

Bichromate of potash	20 gr.
Water	10 ounces

15 to 20 minims must be added to 10 ounces of mixed developer.

Increasing the amount of this solution in the developer adds brilliancy to the prints, and prevents flatness. Increase it for feeble negatives, decrease it for intense; excess will totally destroy half tone. As prints are taken from the developing solution, place them in clear water. When prints are all developed, remove them from the water to the fixing bath, as follows:

Water	32 ounces
Ammonia	2 drachms

Leave the prints in this bath for ten minutes, or two baths for five minutes each for large quantities.

Wash for twenty minutes, mount and dry. Prints when finished may be toned with platinum in the following bath:

Water	20 ounces
Platinum potash chloride	15 gr.
Citric acid	5 gr.

118.—Converting Blue Prints into Brown Prints.

Blue ferro-prussiate photographic prints may be converted into brown prints by the following process:

The positive blue print, thoroughly washed and dried, is plunged into a solution of ammonia, in which it is kept until it has nearly or entirely lost its color. (The operation lasts from two to four minutes.) The print is rinsed and plunged into a bath of tannic acid, the operation being stopped as soon as the desired sharpness and tone are obtained.

This last operation requires about ten minutes. If at the end of this time the color be not dark enough, it is intensified by adding to the bath a few drops of ammonia. After a lapse of one or two minutes, rinse in abundant water.

1. Solution for preparing the sensitized paper:

Tartrate of iron and potassium	15 Gm.
Red prussiate of potash	12 Gm.
Rain water	250 C.c.

2. Solution to remove the color of the print:

Stronger ammonia (0.900)	100 C.c.
Rain water	800 C.c.

3. Solution to give the brown tone:

Tannic acid	10 Gm.
Rain water	500 C.c.

Dissolve and filter.

119.—Toning Blue Prints.

Blue prints may be given the black tone by plunging them into a solution of 4 parts of potash in 100 parts of water; then, when the blue color has entirely disappeared under the action of the potash, and a yellowish color has taken its place, they are immersed in a solution of 4 parts of tannin in 100 parts of water; then, washing them again, we obtain prints whose tone may be assimilated to that of pale writing ink.

120.—Pellett's Method for Making Blue Lines upon White Ground.

The formula is composed as follows:

Gum arabic	385 gr.
Sodium chloride	46 gr.
Tartaric acid	62 gr.
Perchloride of iron	123 gr.
Water	3½ ounces

Highly sized and smooth paper is evenly coated with this mixture, dried in the dark, and exposed under a negative.

Develop with a saturated solution of ferrocyanide of potassium. Fix in a 1 to 20 solution of hydrochloric acid.

121.—Black Lines upon White Ground.

Water	9 ounces
Gelatine	3 drachms
Solution of perchloride of iron (U. S. Ph.)	6 drachms
Tartaric acid	3 drachms
Ferric sulphate	3 drachms

Dissolve, filter and apply to the surface of stout paper (Steinbach medium roll).

After exposure to light, under a diapositive or drawing immerse the print in

Gallic acid	6 drachms
Alcohol	6½ ounces
Water	32 ounces

when the greenish-yellow print will turn to inky black.

Finally wash in pure water.

USEFUL RECEIPTS.

122.—To Find the Focal Length of a Lens—W. H. Sherman's Rule.

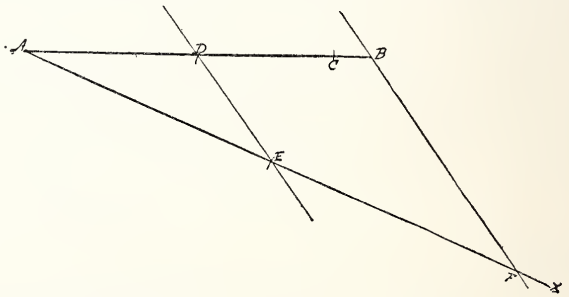
Make two images of any object of convenient length, so that the *difference* between the images will be equal to some part of the object, making the position of the ground-glass on the base of the camera where each image is in focus. The distance between the two positions of the ground-glass thus found will be the same part of the focal length that the difference of the two images is of the object.

Examples: With two images of a foot rule, let one image be 8 inches long and the other 4 inches. The difference being one-third the length of the object, the distance between the two positions of the ground-glass will be one-third of the focal length of the lens.

123.—To Calculate the Focal Fraction of Stops for Lenses.

Divide the focal length obtained by the above method expressed in inches and hundredths, by the diameter of stop opening expressed in hundredths of an inch.

124.—To Find Focal Length of a Lens (another Method, Sherman's).



Let the line AB represent the length of a given object; AC the length of its image on the ground glass, and CD the length of a smaller image; then AD will be the difference in length of the two images. Let the line AE represent the distance between the two positions of the ground glass when each image was in perfect focus on it. (AX is a line of indefinite length, making an acute angle with AB.) Draw the line DE, intersecting AB and AX; draw BF parallel to DE; AF will be the focal length.

125.—Labarraque's Solution.

Chloride of lime	2 ounces
Carbonate of sodium, cryst.	4 ounces
Water	40 ounces

Mix the chloride of lime with 30 ounces of the water; and dissolve the carbonate of soda in the remainder. Mix, boil and filter.

126.—Eau de Javelle.

Dry chloride of lime	2 ounces
Carbonate of potash	4 ounces
Water	40 ounces

Mix the chloride of lime with half of the water; dissolve the carbonate of potash in the remainder. Mix, boil and filter.

127.—A Few Remedies Against Blistering of Albumen Paper.

Do not dry the paper by excessive heat.
Avoid acidity in solutions.
Moisten the print before washing with a sponge saturated in alcohol.
Immerse the print before fixing in a weak alum.
Add a trace of aqua ammonia to the fixing bath.
Add one-tenth part of alcohol to the ordinary toning bath.

128.—Mat Black Varnish.

A tolerably strong solution of sandarac in alcohol, mixed with fine lampblack, dries without gloss, becomes hard without being brittle, and may be applied with a fine brush upon almost any substance.

129.—Invisible Ink.

Chloride of cobalt	50 gr.
Distilled water	1 fluid ounce
Glycerine	10 minims

Dissolve the chloride of cobalt in the distilled water, and add the glycerine.

Writing executed with this ink is invisible on paper, but on warming the writing turns blue. On exposure to damp air it becomes invisible again.

130.—Solution for Making Paper Adhere to Metal.

Tragacanth	30 Gm.
Gum arabic	120 Gm.
Water	500 C.c.

131.—To Precipitate Gold from Spent Sulphocyanate Toning Baths.

Add sulphuric acid and heat, when the gold will separate.

132.—To Keep Unmounted Albumen Prints Flat.

Soak them in equal parts of alcohol, glycerine and water; dry between blotting paper under slight pressure.

133.—Magic Photographs.

Fix an albumen print in perfectly fresh hypo solution and wash well, and soak it in a solution of 1 part bichloride of mercury, ¼ of a part of chloride of ammonium in 60 parts of water, till the photograph is bleached out.

The picture will appear again when brought into contact with hypo solution, or moistened blotting paper previously prepared with the fixing soda.

134.—Solution for Mounting Prints Without Their Cockling.

Nelson's No. 1 photographic gelatine	4 ounces
Water	16 ounces
Glycerine	1 ounce
Alcohol	5 ounces

Dissolve the gelatine in the water, then add the glycerine, and lastly the alcohol.

135.—PERMANENT PASTE.

Arrowroot	10 Gm.
Water	100 Gm.

in which 1 gramme of gelatine has been soaked, and boil. After cooling add 10 grammes of alcohol and a few drops of carbolic acid.

136.—LEATHER COLLODION.

2 p. c. collodion	100 parts
Castor oil	4 parts

137.—LUBRICATOR FOR HOT BURNISHING.

Spermaceti	10 Gm.
Castile soap	10 Gm.
Alcohol	1 liter

138.—TO REMOVE SILVER STAINS FROM THE HANDS.

Sulphate of sodium (Glauber's salt)	½ ounce
Chloride of lime	¼ ounce
Water	1 ounce

Mix thoroughly, and apply with an old toothbrush.

139.—TO FROST A SKYLIGHT.

Very thin starch paste, to which unboiled starch has been added. Must be free from lumps, and be daubed on with a large bristle brush.

140.—TO REMOVE NITRIC ACID STAINS FROM HANDS OR GARMENTS.

Touch the stains with solution of permanganate of potassium; wash, rinse in dilute hydrochloric acid, and wash again.

141.—TO REMOVE YELLOW STAINS FROM BROMIDE PRINTS.

Soak for one or two hours in

Acetic acid	2 ounces
Saturated oxalate of potassium solution	4 ounces

142.—TO REMOVE PYRO STAINS FROM FINGERS.

Wash with a 10 per cent. solution of oxalic acid, or sulphuric acid, diluted with water, 1:20.

143.—TO REMOVE YELLOW STAINS FROM PYRO DEVELOPED NEGATIVES.

Bathe them in sulphorous acid water or in a 10 per cent. solution of sulphite of soda, to which a few drops of sulphuric acid has been added.

144.—TO REMOVE THE ODOR OF HYDROSULPHATE OF AMMONIUM FROM THE DARK-ROOM.

Sprinkle the floor with a solution of nitrate of lead.

145.—TO AVOID HALATION.

A quick drying coating, which is applied to the back of the plate, consists of collodion, with which any dark red or brown pigment is mixed. Spanish brown or rouge answers well.

146.—TO RECOVER SILVER BROMIDE FROM WASTE EMULSION.

Let the emulsion be melted, and then add a small quantity of hydrochloric acid, following by boiling for two or three minutes. The silver bromide precipitates, and the destroyed gelatine is then poured off. The bromide is then placed among the other residues for reduction.

147.—Toning Bath for Gelatine Lantern Slides.

Chloride of platinum	1 gr.
Hydrochloric acid	1 minim
Water	32 ounces

148.—Compound for Blocking Out Large Portions of a Negative.

Mix asphaltum varnish with fine lamp-black, and apply with a camel's-hair brush.

Should be kept in well-stoppered bottles.

149.—Flash-Light Powder for Orthochromatic Plates.

Pure metallic magnesium powder	10 gr.
Nitrate of sodium (finely powdered)	from 50 to 70 gr.

Powder separately and mix on paper without rubbing.

150.—Largest and Smallest Quantities of Chemicals Admitted to the Pyro Developer.

	Largest.	Smallest.
Pyro, per ounce	10 gr.	1¼ gr.
Sulphite of sodium	80 gr.	5 gr.
Carb. of sodium	40 gr.	1 1-5 gr.
Carb. of potassium	21 2-10 gr.	5 gr.

151.—Consumption of Chemicals in Silver Printing on Albumenized Paper.

Of 100 parts of silver used in the albumen printing process will be found

In the finished print	3 per cent
In filters, blottings and cuttings	7 per cent
In the wash water before toning	50 to 55 per cent
In the fixing bath	30 to 35 per cent
In the wash water after fixing	5 per cent

90 per cent. of the silver used may be recovered.

One sheet of paper, 18 x 22, will take from the silver bath from 30 to 45 grains of nitrate of silver.

One sheet of paper, 18 x 22, requires to tone 1½ grains of gold (1 decigram).

About 80 to 90 grains of hyposulphite of sodium are necessary to fix one sheet of paper, 18 x 22.

152.—To Recover Fogged Plates.

Make a solution as follows:

Chromic acid	30 grains
Bromide of potassium	60 grains
Water	10 ounces

and immerse the plates for five minutes. Afterwards wash very thoroughly and rear up to dry.

Or, instead of the above, make the following:

Bichromate of potash	1 ounce
Hydrobromic acid	2 drachms
Water	10 ounces

If hydrobromic acid cannot be obtained, use hydrochloric acid or a soluble bromide; in the last case a few drops of sulphuric acid being added to the solution. Use as before.

TABLE SHOWING COMPARATIVE VALUE OF ALKALINE CARBONATES IN DEVELOPERS. By O. G. Mason.

Commercial Name.	Chemical Symbol.	Molecular Weight.	The Commercial Salt contains of the pure Salt about	100 parts of 36 per cent Acetic Acid Require for Saturation.	Solubility in Water (approximate).
Soda, Caustic	NaHO	40	80 to 92%	26.66 p'rts of 90% Soda	1 part in 2
Sodium Carbonate, Carbonate of Soda, Sal Soda, Crystals,	$Na_2CO_3.10H_2O$	286	96 to 98%	89.38 " 96% "	1 " 2
The same, anhydrous or in dry powder	Na_2CO_3	106	About 98 to 99%	89.38 of 98 to 99% dry Sal Soda.	1 " 6
Sodium Bicarbonate, Bicarbonate of Soda, "Sesqui-carbonate of Soda,"	$NaHCO_3$	84	98 to 100%	50.91 of 99% Bicarb. Soda.	1 " 12

Equal work is done by 80 parts of Caustic Soda, 286 parts of Sal Soda (crystals), 106 parts of Sal Soda (dry), 168 parts of Bicarbonate of Soda. These quantities must be increased to make up for any impurity contained in the sample being used; for this purpose the usual percentage of impurity given in the above table may be assumed for all ordinary photographical uses.

Potassa (Caustic Potash)	KHO	56	80 to 95%	37.33 parts of 90% Potassa.	1 part in 1
Potassium Carbonate, Carbonate of Potassa, Sal Tartar, Saleratus,	$K_2CO_3.1\frac{1}{2}H_2O$	165	76 to 96% Usually about 81%	51.11 parts of 81% Carb. Potassa.	1 " 1
Potassium, Carbonate, dry	K_2CO_3	140	About 95%	122.74 parts of 95% Carb. Potassa.	1 " 1
Potassium Bicarbonate, Bicarbonate of Potassa,	$KHCO_3$	100	100%	60 parts of 100% Bicarb. Potassa.	1 " 4

Equal work is done by 112 parts Caustic Potassa, 165 parts (about) ordinary Carbonate Potassa, 200 parts of Bicarbonate Potassa. These quantities must be increased in proportion to impurities, as noted in case of Soda. These two alkalies are interchangeable for doing the same amount of work when *pure*, and when the one named in a given formula can not be obtained the table may assist in choosing a substitute of proper strength and solubility.

Dry or anhydrous Carbonate of Potassium is not usually found in the market.



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By F. H. WORSLEY-BENISON

" . . . on the foremost rocks
Touching, upjetted in spirts of wild sea-smoke."
—*Tennyson*

TABLE OF STRENGTHS OF ALCOHOL.

Specific Gravities of Mixtures of Different Proportions of Alcohol (s. g. .7932) and Water, by Weight and by Volume, at 14° R. (63.5° F.) Meisner.

Parts of		Specific Gravity of Mixture by Weight.	Specific Gravity of Mixture by Volume.	Parts of		Specific Gravity of Mixture by Weight.	Specific Gravity of Mixture by Volume.
Alcohol.	Water.			Alcohol.	Water.		
100	0	0.7932	0.7932	49	51	0.9196	0.9324
99	1	0.796	0.7969	48	52	0.9219	0.9344
98	2	0.7988	0.8006	47	53	0.9242	0.9364
97	3	0.8016	0.8042	46	54	0.9264	0.9384
96	4	0.8045	0.8078	45	55	0.928	0.9404
95	5	0.8074	0.8114	44	56	0.9308	0.9424
94	6	0.8104	0.815	43	57	0.9329	0.9443
93	7	0.8135	0.8185	42	58	0.9350	0.9461
92	8	0.8166	0.8219	41	59	0.9371	0.9478
91	9	0.8196	0.8253	40	60	0.9391	0.9495
90	10	0.8225	0 8286	39	61	0.9410	0.9512
89	11	0.8252	0.8317	38	62	0.9429	0.9529
88	12	0.8279	0.8346	37	63	0.9448	0.9547
87	13	0.8304	0.8373	36	64	0.9467	0.9564
86	14	0.8329	0.840	35	65	0.9486	0.958
85	15	0.8353	0.8427	34	66	0.9505	0.9695
84	16	0.8376	0.8454	33	67	0.9524	0.9609
83	17	0.8399	0.8581	32	68	0.9543	0.9621
82	18	0.8422	0.8508	31	69	0.9561	0.9632
81	19	0.8446	0.8534	30	70	0.9578	0.9643
80	20	0.847	0.8561	29	71	0.9594	0.9654
79	21	0.8494	0.8596	28	72	0.9608	0.9665
78	22	0.8519	0.8616	27	73	0.9621	0.9676
77	23	0.8543	0.8642	26	74	0.9634	0.9688
76	24	0.8567	0.8668	25	75	0.9647	0.970
75	25	0.859	0.8695	24	76	0.966	0.9712
74	26	0.8613	0.8723	23	77	0.9673	0.9723
73	27	0.8635	0.8751	22	78	0.9686	0.9734
72	28	0 8657	0.8779	21	79	0.9699	0.9745
71	29	0.868	0.8806	20	80	0.9712	0.9756
70	30	0.8704	0.8833	19	81	0.9725	0.9766
69	31	0.8729	0.886	18	82	0.9738	0.9775
68	32	0.8755	0.8885	17	83	0.9751	0.9784
67	33	0.8781	0.891	16	84	0.9763	0.9793
66	34	0.8806	0.8934	15	85	0.9795	0.9803
65	35	0.8831	0.8958	14	86	0.9786	0.9813
64	36	0.8855	0.8982	13	87	0.9796	0.9823
63	37	0.8879	0.9096	12	88	0.9806	0.9834
62	38	0.8902	0.9029	11	89	0.9817	0.9846
61	39	0.8925	0.9052	10	90	0.9830	0.9849
60	40	0.8948	0.9075	9	91	0.9844	0.9873
59	41	0.8971	0.9098	8	92	0.9860	0.9888
58	42	0.8994	0.9121	7	93	0.9878	0.9901
57	43	0.9016	0.9145	6	94	0.9897	0.9915
56	44	0.9038	0.9168	5	95	0.9914	0.9929
55	45	0.9060	0.9191	4	96	0.9931	0.9943
54	46	0.9082	0.9214	3	97	0.9948	0.9957
53	47	0.9104	0.9237	2	98	0.9965	0.9971
52	48	0.9127	0.9259	1	99	0.9982	0.9985
51	49	0.915	0.9281	0	100	1.0000	1.0000
50	50	0.9173	0.9303	..	..	.....	.....

TABLE OF THE SYMBOLS, ATOMICITY, ATOMIC AND EQUIVALENT WEIGHTS OF THE ELEMENTS.

Name.	Symbol.	Atomicity.	Atomic Weight.	Equivalent Weight.
Aluminum	Al	iii (iv)	27.5	13.7
Antimony (Stibium)	Sb	iii (v)	122.0	122.0
Arsen	As	iii (v)	75.0	75.0
Barium	Ba	ii	137.0	68.5
Beryllium (Glucinum)	Be	ii or iii	9.4	4.7
Bismuth	Bi	iii (v)	208.0	208.0
Boron	Bo	iii (v)	11.0	11.0
Bromine	Br	i (iii, v, vii)	80.0	80.0
Carbon	C	iv	12.0	6.0
Cadmium	Cd	ii	112.0	56.0
Caesium	Cs	i	133.0	133.0
Calcium	Ca	ii	40.0	20.0
Cerium	Ce	iii (iv)	138.0	46.0
Chlorine	Cl	i (iii, v, vii)	35.5	35.5
Chromium	Cr	iv (vi)	52.2	26.1
Cobalt	Co	ii (iv)	58.8	29.4
Copper	Cu	ii	63.4	31.7
Didymium	Di	iii	145.0	
Erbium	E	iii	169.0	
Fluorine	F	i	19.0	19.0
Gallium	Ga	iv	68.0	
Germanium	Ge	iv	72.2	
Glucinum	G	ii	9.4	4.7
Gold	Au	i (iii)	196.0	196.0
Hydrogen	H	i	1.0	1.0
Indium	In	iii (iv?)	113.4	37.8
Iodine	I	i, iii, v, vii	127.0	127.0
Iridium	Ir	ii (iv, vi)	198.0	99.0
Iron	Fe	ii (iv, vi)	56.0	28.0
Lanthanium	La	iii	139.0	46.3
Lead (Plumbum)	Pb	ii (iv)	207.0	103.5
Lithium	Li	i	7.0	7.0
Magnesium	Mg	ii	24.0	12.0
Manganese	Mn	ii (iv, vi, vii)	55.0	27.5
Mercury	Hg	ii	200.0	100.0
Molybdenum	Mo	vi	96.0	46.0

TABLE OF THE SYMBOLS, ETC.—(*Continued.*)

Name.	Symbol.	Atomicity.	Atomic Weight.	Equivalent Weight.
Niobium (Columbium)	Nb	v	94.0	18.8
Nickel	Ni	ii (iv)	58.8	29.4
Nitrogen	N	iii (v)	14.0	14.0
Osmium	Os	ii (iv, vi, viii)	199.0	99.5
Oxygen	O	ii (iv?)	16.0	8.0
Palladium	Pd	(ii, iv, vi)	106.6	53.25
Phosphorus	P	iii (v)	31.0	31.0
Platinum	Pt	ii (iv, vi)	197.4	98.7
Potassium (Kalium)	K	i	39.0	39.0
Rhodium	Rh	ii (vi)	104.4	52.2
Rubidium	Rb	i (v)	85.4	85.4
Ruthenium	Ru	ii (iv, vi, viii)	104.4	52.2
Scandium	Sc	ii (iv, vi, viii)	43.9	52.2
Selenium	Se	ii (iv, vi)	79.4	39.7
Silicon (Silicium)	Si	iv	28.0	14.0
Silver (Argentum)	Ag	i	108.0	108.0
Sodium (Natrium)	Na	i	23.0	23.0
Strontium	Sr	ii	87.5	43.7
Sulphur	S	ii (iv, vi)	32.0	16.0
Tantalum	Ta	v	182.0	36.4
Tellurium	Te	ii (iv, vi)	127.0	64.0
Thallium	Tl	i (iii)	204.0	204.0
Thorium	Th	iv	231.5	57.87
Tin (Stannum)	Sn	ii, iv	118.0	59.0
Tungsten (Wolfram)	W	iv, vi	184.0	92.0
Uranium	U	vi (iv)	240.0	60.0
Vanadium	V	iii (v)	51.2	51.2
Ytterbium	Yt	iv	172.6	17.1
Yttrium	Y	ii	61.7	30.85
Zinc	Zn	ii	65.0	32.5
Zirconium	Zr	iv	90.0	44.8

TABLE OF SYMBOLS, ATOMIC WEIGHT AND SOLUBILITIES OF THE PRINCIPAL CHEMICALS USED IN PHOTOGRAPHY.

Abbreviations.—s., soluble; v. s., very soluble; sp. s., sparingly soluble; n s., not soluble; dec., decomposed; del., deliquescent.

Name.	Symbol.	Molecular Weight.	One Part is Soluble in Cold Water.	One Part is Soluble in Hot Water.	Alcohol.
Acid, Acetic	$C_2H_4O_2$	60	in	any proportion.	
" Boric or Boracic	H_3BO_3	62	25	3	6
" Carbolic (see Phenol)	C_6H_6O	94	16.6	3	6
" Citric	$C_6H_8O_7+H_2O$	210	0.75	0.5	s.
" Digallic (see Tannin)	$C_{27}H_{22}O_{17}$	618	0.8	0.5	0.8
" Gallic	$C_7H_6O_5+H_2O$	188	100	3	8
" Hydrobromic	HBr	81	s.	s.	s.
" Hydroiodic	HI	128	s.	s.	s.
" Hydrochloric	$HCl+7H_2O$	36.5	s.	s.	s.
" Hydrofluoric	$HFl+3H_2O$	74	s.	s.	s.
" Hydrocyanic	HCy	27	s.	s.	s.
" Hydrosulphuric	H_2S	34	s.	s.	s.
" Muriatic (see Hydrochloric)					
" Nitric	HNO_3	63	in	all proportions.	
" Nitrous	HNO_2	47	absorbed.		
" Oxalic	$C_2H_2O_4+2H_2O$	126	8	0.2	s. also in ether
" Pyrogallic (see Pyrogallol)	$C_6H_6O_3$	126	2	v. s.	also v. s. in ether.
" Salicylic	$C_7H_6O_3$	138	7.6	9	also v. s. in ether.
" Sulphuric	H_2SO_4	98	in	all proportions.	
" Sulphurous	H_2SO_3	82	absorbed.		
" Tannic (see Digallic)					
" Tartaric	$C_4H_6O_4$	150	0.8	0.5	5
Alcohol, Ethyl	C_2H_6O	46	in	all proportions.	

			in all proportions.		
Alcohol, Methyl (see Wood Alcohol)	CH_4O	32			
Alum (see Potassium Aluminium Sulphate)	$Al_2(SO_4)_3K_2SO_4 24H_2O$	948	10	8	n. s.
Alum Chrome (see Potassium Chromic Sulph.)	$Cr_2(SO_4)_3K_2SO_4 24H_2O$	999	10	dec.	n. s.
Amidol (Diamido Phenol)	$C_6H_8N_2O$	124	very	soluble.	
Ammonia, Gaseous	NH_3	17	very	soluble.	
Ammonium Bichromate	$(NH_4)_2Cr_2O_7$	252	v. s.	v. s.	
" Bromide	NH_4Br	98	1.29	0.7	31.5
" Cadmium Bromide	$2NH_4Br2CdBr_2+H_2O$	584	0.73		5.3
" " Iodide	$2NH_4ICdI_2+2H_2O$	692	0.58		0.70
" Chloride	NH_4Cl	53.5	3	1	sp. s.
" Ferric Oxalate	$Fe_2(C_2O_4)_6(NH_4)_6+8H_2O$	892	2.10	0.29	sp. s.
" Fluoride	NH_4Fl	37	v. s.	v. s.	sp. s.
" Iodide	NH_4I	145	1	0.5	s.
" Nitrate	NH_4NO_3	80	2	1	s.
" Oxalate	$(NH_4)_2C_2O_4$	124	4	2	s.
" Sulphide	NH_4HS	51	v. s.	v. s.	o. s.
" Sulpho-Cyanate	NH_4CNS	76	s.	s.	s.
Aurantia (Hexanitro-diphenylamin Ammonia)	$C_{12}H_4(NO_2)_6N.NH_4$	456			
Aurin (Trioxy-triphenyl-Carbinol)	$C_{19}H_{14}O_3$	290			
Barium Chloride	$BaCl_2+2H_2O$	345	2.18	1.5	sp. s.
" Nitrate	$Ba(NO_3)$	261	12.2	2.84	n. s.
" Per-oxide	BaO_2	169	v. s.	n. s.	n. s.
Benzole or Benzine (Trioxy-triphenyl-Carbinol)	C_6H_6	78	n. s.	n. s.	s.
Borax (see Sodium Biborate)					
Cadmium Bromide	$CdBr_2+4H_2O$	344	1.5	1	sp. s.
" Iodide	CdI_2	366	1 5	1	s.
Calcium Bromide	$CaBr_2+4H_2O$	272	1	.75	s.
" Carbonate (see Chalk)	$CaCO_3$	100	n. s.	n. s.	n. s.
" Chloride	$CaCl_2$	111	.75	.5	10.
" Hypochlorite (see Chloride of Lime)	$CaCl_2O_2CaCl_2(?)$	254	sp. s.	sp. s.	dec.
Calomel (see Mercurous Chloride)					
Camphor	$C_{10}H_{16}O$	152	1000		v. s.
Caustic Potash (see Potassium Hydrate)					
" Soda (see Sodium Hydrate)					
Chalk (see Calcium Carbonate)					

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Abbreviations.—s., soluble; v. s., very soluble; sp. s., sparingly soluble; n. s., not soluble; dec., decomposed; del., deliquescent.

Name.	Symbol.	Molecular Weight.	One Part is Soluble in Cold Water.	One Part is Soluble in Hot Water.	Alcohol.
Chinoline Blue or Cyanine	$C_{29}H_{35}NaI$	538	sp. s.	sp. s.	s.
" Red	$C_{26}H_{19}NaCl$	394.5			
Chloride of Lime (see Calcium Hypochlorite)					
Chlorine	Cl	35 5	absorbed by 1 to 2.5 vols.		
Chloroform	$CHCl_3$	119.5	sp. s.	sp. s.	v. s.
Chrome Alum (see Alum Chrome)					
Copper Acetate (see Verdigris)	$Cu(C_2H_3O_2)_2,H_2O$	199	14	5	1 in 14
" Bromide	$CuBr_2$	223.4	1	.75	s.
" Chloride	$CuCl_2,H_2O$	170.5	1	.75	v. s.
" Sulphate (see Blue Vitriol)	$CuSO_4,5H_2O$	249.2	3	1	n. s.
" " and Ammonia	$CuSO_4,4NH_3+H_2O$	245.5	s.	v. s.	n. s.
Corrosive Sublimate (see Mercuric Chloride)					
Dextrine	$C_6H_{10}O_5$	162	easily s.		n. s.
Eikonogen (Amido-β-Naphthol-β-Monosulphonate of Sodium)	$C_{10}H_8SO_2NaN$	261	40	e. s.	s.
Eosine, Yellow Shade (Tetra Bromo-fluoresceine Potassium)	$C_{20}H_6Br_4O_5K_2$	724	s.	s.	s.
Eosine, Red Shade (Tetra Brom.-fluores. Sod.)	$C_{20}H_6Br_4O_5Na_2$	692	s.	s.	s.
Epsom Salt (see Magnesium Sulphate)					
Erythrosine M. (Tetra Iodo-fluoresceine Potassium or Sodium)	$C_{20}H_6I_4O_5K_2$ or Na_2	912 or 880	s.	s.	s.
Erythrosine G. (Di-iodo-fluoresceine Potassium or Sodium)	$C_{20}H_6I_2O_5K_2$ or Na_2	660 or 628	s.	s.	s.

Gelatine, Glutine	49,3C,6,6H18,3N25,8O	1267.2	sp. s.	e. s.	n. s.
Glycerine	$C_3H_8O_3$	92	in all proportions.		
Glycine (Oxy-phenylglycine)	$C_8H_9O_3N$	167			
Gold, Neutral Chloride	$AuCl_3$	303.5	1	5	also in ether.
" and Cadmium Chloride	$CaAuCl_5$	414.5	s.	s.	s.
" and Potassium Chloride	$KAuCl_4+5H_2O$	468	s.	s.	s.
" and Sodium Chloride	$NaAuCl_4+8NaCl+2H_2O$	892	s.	s.	s.
" Sodium Hyposulphite	$AuNa_3S_4+2H_2O$	525	s.	s.	s.
Gun Cotton (Tetra-nitrate Cellulose)	$C_{12}H_{16}O_6(NO_3)_4$	564	n. s.	n. s.	} in ether
" " (Tri-nitrate Cellulose)	$C_{10}H_{17}O_7(NO_6)_3$	459	n. s.	n. s.	} alcohol
Hydrochinone	$C_6H_6O_2$	110	s.	s.	also in ether.
Hydroxylamine Hydrochlorate	NH_3OHCl	69.5	0.6	e. s.	4
Iodine	I	127	sp. s.	sp. s.	e. s.
Iridium Tetra-chloride	$IrCl_4$	335			
Iron, Ammonium Sulphate	$FeSO_4(NH_4)_2SO_4+6H_2O$	392	v. s.	dec.	n. s.
" Chloride (Ferric)	Fe_2Cl_6	325	.75	.5	1 in 1
" Chloride (Ferrous)	$FeCl_2$	127	2	1	1 in 1
" Citrate	$Fe_2(C_6H_5O_7)_2$	598	s.	s.	n. s.
" Citrate and Ammonia	$(C_6H_5O_7)_2Fe_2(NH_4)_3$	355	s.	s.	sp. s.
" Iodide	FeI_2	310	v. s.	v. s.	v. s.
" Nitrate	$Fe(NO_3)_2,6H_2O$	288	v. s.	dec.	dec.
" Oxalate (Ferric)	$Fe_2(C_2O_4)_3$	376	s.	s.	n. s.
" " (Ferrous)	FeC_2O_4	144	in potas sium oxal.		n. s.
" Sulphate (Ferric)	$Fe_2(SO_4)_3$	400	s.	dec.	s.
" " (Ferrous)	$FeSO_4,7H_2O$	278	1.5	1	n. s.
Kaoline	$H_2Al_2Si_2O_8+H_2O$	258.8	not soluble.		
Lead, Acetate (see Sugar of Lead)	$Pb(C_2H_3O_2)_2,3H_2O$	378	2.5	2	1 in 12.5
" Carbonate	$PbCO_4$	366	n. s.	sp. s.	n. s.
" Iodide	PbI_2	460	s.	s.	n. s.
" Nitrate	$Pb(NO_3)_2$	330	7.7	7	s.
" Oxide	PbO	222.4	n. s.	n. s.	Alkalis.
Lithium, Bromide	LiBr	87	.66	.5	v. s.
" Chloride	$LiCl+H_2O$	60.5	1.3	1	s.
" Iodide	LiI	134	.61	.5	s.
Magnesium, Bromide	$MgBr_2$	184	1	.75	s.

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Abbreviations.—s., soluble; v. s., very soluble: sp. s., sparingly soluble; n. s., not soluble; dec., decomposed; del., deliquescent.

NAME.	SYMBOL.	MOLECULAR WEIGHT.	ONE PART IS SOLUBLE IN COLD WATER.	ONE PART IS SOLUBLE IN HOT WATER.	ALCOHOL.
Magnesuim, Chloride	$MgCl_2$	95	2	1.5	s.
" Iodide	MgI_2	246.3	1	.75	v. s.
" Sulphate (see Epsom Salt)	$MgSO_4,7H_2O$	246	1.3	1	sp. s.
Manganous Chloride	$MnCl_2+4H_2O$	198	s.	s.	n. s.
Mercury, Chloride (Mercuric) (see Corros. Subl.)	$HgCl_2$	271	19	3	5
" " (Mercurous) (see Calomel)	Hg_2Cl	235.5	n. s.	n. s.	n. s.
" Cyanide	$HgCy_2$	252	8	2	1 in 20
" Iodide (Mercuric)	HgI_2	454	sp. s.	sp. s.	sp. s.
" " (Mercurous)	Hg_2I	654	n. s.	n. s.	n. s.
Metol (Mono-methyl Para-amidometakresol)	$C_8H_{11}NO$	137	s.	s.	s.
Para-amidophenol	C_6H_7NO	109	sp. s.	s.	.....
Para-amidophenol Sodium	C_6H_6NaNO	131	easily soluble.		.....
Para-amidophenol Hydrochlorate	C_6H_7NOHCl	145.5	s.	s.	s.
Para-rosaniline (Triamido-phenyl-Carbinol)	$C_{19}H_{19}N_3O$	305	.....	.....	.....
Phenol (see Carbolic Acid)	.....	.....	.....	.....	.....
Platino-potassium Chloride or Chloro-platinite of Potassium	K_2PtCl_4	417.4	6.	.....	s.
Platino-sodium Chloride or Chloro-platinite of Sodium	Na_2PtCl_4	385.4	soluble.		.....
Platinum Chloride	$PtCl_4+5H_2O$	429.4	.....	*	.....
Potassa (see Potassium Hydrate)	.....	.....	.....	.....	.....

* Real platinum-chloride is but little soluble in water; the article of commerce of that name answers to the formula $PtCl_4 2HCl+6H_2O$, and is of the atomic weight 520.4 (K. Schwier). It is easily soluble in water, probably in the proportion of 1:6.

Potassium, Aluminium Sulphate (see Alum)	$Al_2(SO_4)_3,K_2SO_4,24H_2O$	948	10	8	n. s.
" Bicarbonate	$KHCO_3$	100	3	2	n. s.
" Bichromate	$K_2Cr_2O_7$	295	10	7	n. s.
" Bromide	KBr	119	2	1	1 in 90
" Carbonate	$KO_2C_3+2H_2O$	174	.75	.5	n. s.
" Chlorate	$KClO_3$	122.5	16	2	n. s.
" Chloride	KCl	74.5	3	2	sp s.
" Chromic Sulph. (see Chrome Alum)	$Cr_2(SO_4)_3,K_2SO_4,24H_2O$	999	10	dec.	n. s.
" Citrate	$K_3C_6H_5O_7H_2O$	324.3	6.6	.3	n. s.
" Cyanide	KCy	65.1	1	.5	sp. s.
" Ferric Sulphate	$K_2SO_4,Fe_2(SO_4)_3,24H_2O$	100.6	s.	s.	n. s.
" Ferri-cyanide (see Red Prussiate)	$K_6Fe_2Cy_{12}$	658.6	2.5	1.2	n. s.
" Ferro-cyanide (see Yellow Pruss.)	K_4FeCy_6	368.4	3	1	n. s.
" Fluoride	$KFl+2H_2O$	94	v. s.	v. s.	v. s.
" Hydrate	KOH	56	.5	.25	sp. s.
" Iodide	KI	166	.75	.5	1 in 16
" Nitrate (see Saltpetre)	KNO_3	101	4	1	n. s.
" Oxalate	$KC_2O_4H_2O$	235	3	2	sp. s.
" Permanganate	$KMnO_4$	158	16	10	n. s.
" Sulpho-cyanate	KCyS	97	2	1	sp. s.
Pyrogallo. (see Pyrogallic Acid)					
Rhodan (German appellation for Cyanates)					
Rodinal (ready-prepared Para-amido Developer)					
Silver, Acetate	$AgC_2H_3O^2$	167	sp. s.	sp. s.	n. s.
" Bromide	AgBr	188	n. s.	n. s.	in HCl and HBr.
" Carbonate	Ag_2CO_3	276	n. s.	n. s.	n. s.
" Chloride	AgCl	143.5	n. s.	n. s.	Ammonia, cyan. potass. hyposulphite of soda.
" Citrate	$Ag_3C_6H_5O_7$	513	sp. s.	sp. s.	
" Fluoride	AgFl	127	v. s.	v. s.	v. s.
" Iodide	AgI	235	n. s.	n. s.	same as Chloride.
" Nitrate	$AgNO_3$	170	1	.5	sp. s.

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Abbreviations.—s., soluble; v. s., very soluble; sp. s., sparingly soluble; n. s., not soluble; dec., decomposed; del , deliquescent.

Name.	Symbol.	Molecular Weight.	One Part is Soluble in Cold Water.	One Part is Soluble in Hot Water.	Alcohol.
Silver, Nitrite	$AgNO_2$	154	300	dec.	n. s.
" Oxalate	$Ag_2C_2O_4$	304	sp. s.	s.	n. s.
" Oxide	Ag_2O	232	n. s.	n. s.	n. s.
" Sulphide	Ag_2S	248	n. s.	n. s.	n. s.
Soda, Caustic (see Sodium Hydrate)					
Sodium Acetate	$NaC_2H_3O_2,6H_2O$	190	3	.66	n. s.
" Biborate (Borax)	$Na_2B_4O_7,10H_2O$	382	12.5	2	n. s.
" Bromide	$NaBr$	103	1.25	1	1:16
" Bicarbonate	$NaHCO_3$	84	12	dec.	n. s.
" Carbonate	$Na_2CO_3,10H_2O$	286	2	1	n. s.
" Chloride	$NaCl$	58.5	2.75	2.75	n. s.
" Citrate	$Na_3C_6H_5O_7$	258	1	.5	sp. s.
" Hydrate	$NaHO$	40	1.5	·5	sp. s.
" Hypo-sulphite	$Na_2S_2O_3 5H_2O$	248	1.5	1	sp. s.
" Iodide	NaI	150	5	.3	sp. s.
" Nitrate	$NaNO_3$	85	1.36	1	·1 in 37
" Sulph-antimoniate or Schlippe's Salt.	$NaSbS_3$	241	s.	s.	n. s.
" Sulphate	$Na_2SO_4,10H_2O$	322	2	4	s.
" Sulphide	$Na_2S,9H_2O$	240	s.	s.	sp. s.
" Sulphite	$Na_2SO_3,7H_2O$	252	4	2	sp. s.
" Tungstate	$Na_2WO_4+2H_2O$	326	s.	s.	n. s.
" Thio-sulphate (see Hypo-sulphite)					
Strontium, Bromide	$SrBr_2,6H_2O$	355.5	1	.75	sp. s.
" Chloride	$SrCl_2,6H_2O$	266.5	1.8	1	sp. s.

Strontium, Nitrate	$Sr(NO_3)_2$	211.5	5	2	sp. s.
Sugar of Lead (see Lead Acetate)					
Tannin (see Digallic Acid)					
Thymol	$C_6H_3(CH_3(C_3H_7)COO$	177	sp.		and in ether.
Tin, Chloride (Stannic)	$SnCl_4$	260	dec.	in much	water.
" Chloride (Stannous)	$SnCl_2,2H_2O$	225	135:100	655:100	v. s.
Uranium, Bromide	$UBr_2,4H_2O$	352	1	.5	sp. s.
" Nitrate	$UO_2(NO_3)_2,6H_2O$	384	.5	.25	v. s.
" Sulphate	$UO_2(SO_4),3H_2O$	302	.5	.25	v. s.
Verdigris (see Copper Acetate)					
Vitriol, Blue (see Copper Sulphate)					
" Green (see Iron Sulphate)					
" White (see Zinc Sulphate)					
Water	H_2O	18			
Washing Soda (see Sodium Carbonate)					
Wood Alcohol (see Alcohol Methyl)					
Zinc, Bromide	$ZnBr_2$	225	del.	and e. s.	s.
" Chloride	$ZnCl_2$	136	.33		s.
" Iodide	ZnI_2	319	.33	dec.	v. s.
" Nitrate	$Zn(NO_3)_2,6H_2O$	296	del.	del.	del.
" Sulphate (see White Vitriol)	$ZnSO_4,7H_2O$	287	2.	1.	n. s.
Zircon Earth	Z_1O_2	121.6	n. s.	n. s.	n. s.

IMPURITIES IN PHOTOGRAPHIC CHEMICALS AND TESTS FOR THEM.

SUBSTANCE.	IMPURITIES POSSIBLY PRESENT.	TESTS.
Ammonia	Carbonic Acid.	Renders lime-water milky.
	Dissolved solid matter	Residue left on evaporation.
	Chlorides.	After acidulating with nitric acid, it gives a precipitate with silver nitrate, which, after washing, is readily soluble in ammonia, and re-precipitated by nitric acid.
	Sulphates.	After acidulating with nitric acid, it gives a precipitate with barium nitrate.
	Lime.	A white precipitate with oxalate of ammonium.
	Lead is often present, derived from the action upon flint glass bottles.	Black precipitate with sulphuretted hydrogen.
Nitric Acid	Traces of sulphuric acid.	After dilution it gives a precipitate with barium nitrate.
	Chlorides.	After dilution it gives a precipitate with silver nitrate.
	Peroxide of nitrogen.	The acid is yellow.
	Iodine may be present if the acid be prepared from sodium nitrate.	After dilution and cooling it gives a blue color with starch paste or mucilage.
Hydrochloric Acid	Free chlorine.	Liberates iodine from solution of potassium iodide. See also chlorides, nitric acid.
	Sulphuric acid.	As above for nitric acid.
	Perchloride of iron.	Yellow color. Brown precipitate with ammonia added till it smells slightly.
Hydrochloric Acid	Arsenic.	Marsh's test.
	Some yellow samples contain no iron, but an organic salt, and give an alkaline ash on ignition of the residue after evaporation.	Reinsh's test; a small piece of copper foil becomes coated on boiling in dilute acid.
Sulphuric Acid	Bisulphate of potassium.	Residue on evaporation.
	Sulphate of lead.	Milkiness on dilution. May be completely freed from lead by diluting with three or four times as much water, and allowing to settle.
	When sold as pure, it invariably contains a trace of iron. Common acid is also liable to contain arsenic, selenium, thallium, and many other substances.	No easy test can be given, as the substances are so numerous; some of them volatile, and most require separation from the acid before detection.
	Organic matter, as a piece of straw in a carboy of acid.	Gives a brown color to the acid.
Acetic Acid	Water.	Does not solidify when cooled to 17° C, (53° F.)
	Sulphurous and hydrochloric acids.	White precipitate with silver nitrate.
	Aldehyde, or volatile tarry matter.	Blackens in the light after adding silver nitrate.
	Organic sulphuric acid.	Smell of garlic.
Citric Acid	Tartaric acid.	Strong solution of potassium acetate added to a strong solution of the acid will deposit white crystalline bitartrate.
Pyrogallic Acid	Metagallic acid.	Black residue insoluble in water.
Silver Nitrate	Free nitric acid.	Reddens litmus paper (neutral silver nitrate does not affect litmus).
Potassium Carbonate	Chlorides and sulphates.	Same as for ammonia.
Potassium Iodide	Potassium carbonate.	A strong solution is alkaline to test paper.
	Sulphates and chlorides.	Same as for ammonia.
	Potassium iodate.	A pretty strong solution becomes yellow from liberation of iodine on addition of dilute sulphuric acid, or better, a strong solution of citric acid.

IMPURITIES IN PHOTOGRAPHIC CHEMICALS AND TESTS FOR THEM.—*Continued.*

Substance.	Impurities Possibly Present.	Test.
Potassium Bromide	Similar to potassium iodide.	See potassium iodide.
Sodium Carbonate	Chlorides and sulphates.	Same as for ammonia.
Sodium Chloride	Chloride of calcium.	Oxalate of ammonium (after addition of a little acetic acid) gives a milkiness or precipitate, indicating calcium; filter this out, and add ammonia, chloride of ammonium, and phosphate of sodium (clear solutions). A precipitate indicates magnesium. Both the above cause dampness in wet weather.
	Chloride of magnesium.	
	Sodium sulphate.	As for sulphates in ammonia.
Potassium Cyanide	Potassium carbonate nearly always present.	Effervescence with dilute acids, giving off a gas carbonic anhydride, which renders lime water turbid.
Potassium Hydrate		
Kaolin	Chalk.	Effervescence with dilute acids.
Water	Sulphates and chlorides.	Same as for ammonia.
	Calcium carbonate, temporary hardness.	Deposited by boiling.
	Ammonia, almost always present in distilled and rain water.	Test as for calcium chloride, see sodium chloride.
		Brown coloration, or precipitate with Nessler's re-agent.
Gelatine	Alum.	Ash, sometimes as much as 10 per cent.
	Fatty matter.	Separated by precipitation with alcohol. Dissolved out by ether or benzine, and left as a residue on evaporation of the solvent.
Ammonium Bromide	Potassium bromide, or other non-volatile bodies.	Leaves a residue when heated.
	Ammonium chloride.	Same as for chlorides in ammonia.
Pyrogallic Acid	Powdered glass.	Left behind on solution.
Potassium Iodide	Potassium bromide.	The crystals of bromide are usually more transparent than those of iodide, but no reliance can be placed on this.
Silver Nitrate	Potassium nitrate, sometimes present in the fused sticks, not in the crystals.	Will not yield the full quantity of chloride on precipitation with HCl. Gives a purple color to flame.
Calcium Chloride	Calcium hydrate.	The clear filtered solution made with distilled water is alkaline to test paper, and gives a precipitate on breathing into it through a tube.
Pure Chemicals generally.	Broken glass, bits of straw, wood, paper, &c.	These impurities either float or sink on the solution, and may easily be seen.

PERCENTAGE OF REAL AMMONIA IN SOLUTIONS OF DIFFERENT DENSITIES AT 14° CENTIGRAD.—CARIUS.

Specific Gravity.	Percent'ge Ammonia.	Specific Gravity.	Percent'ge Ammonia.	Specific Gravity,	Percent'ge Ammonia.	Specific Gravity.	Percent'ge Ammonia.
0.8844	36.0	0.9052	27.0	0.9314	18.0	0.9631	9.0
0.8864	35.0	0.9078	26.0	0.9347	17.0	0.9670	8.0
0.8885	34.0	0.9106	25.0	0.9380	16.0	0.9709	7.0
0.8907	33.0	0.9133	24.0	0.9414	15.0	0.9749	6.0
0.8929	32.0	0.9162	23.0	0.9449	14.0	0.9790	5.0
0.8953	31.0	0 9191	22.0	0.9484	13.0	0.9831	4.0
0.8976	30.0	0.9221	21.0	0.9520	12.0	0.9873	3.0
0.9001	29.0	0.9251	20.0	0.9556	11.0	0.9915	2.0
0.9026	28.0	0.9283	19.0	0.9593	10.0	0.9959	1.0

SOLUBILITY OF THE SILVER HALOIDS. By E. Valenta.

In the *Photographic Society's Journal* the following table, the result of a series of experiments, is given.

Solvent.	Concentration.	100 g. of solution can dissolve in grammes.			Remarks.
		Ag Cl.	Ag Br.	Ag I.	
Sodium hyposulphite.....	1 : 100	0.40	0.35	0.03	
" "	5 : 100	2.00	1.90	0.15	
" "	10 : 100	4.10	3.50	0.30	The estimations were made at 20° C.
" "	15 : 100	5.50	4.20	0.40	
" "	20 : 100	6.10	5.80	0.60	
Ammonium hyposulphite..	1 : 100	0 57	....	....	For bromide and iodide of silver similar results were obtained as with sodium hyposulphite.
" "	5 : 100	1.32	....	....	
" "	10 : 100	3.92	....	....	
Sodium sulphite.....	10 : 100	0.44	0.04	0.01	
" "	20 : 100	0.95	0.08	0.02	
Ammonium sulphite	10 : 100		traces		
Ammonium carbonate.....	10 : 100	0.05	....	....	
Ammonia.....	3%	1.40	....	....	
"	15%	7.58	....	....	
Magnesium chloride.....	50 : 100	0.50	..	...	
Potassium cyanide.....	5 : 100	2.75	6.55	8.23	25° C.
Ammonium sulphocyanide	5 : 100	0.08	0.21	0.02	
" "	10 : 100	0.54	2.04	0.08	23° C.
" "	15 : 100	2.88	5.30	0.13	
Potassium sulphocyanide.....	10 : 100	0.11	0.73	....	25° C.
Calcium sulphocyanide.....	10 : 100	0.15	0.53	0.03	
Barium sulphocyanide.....	10 : 100	0.20	0.35	0.02	
Aluminium sulphocyanide.....	10 : 100	2.02	4.50	0.02	
Thiocarbamide.....	10 : 100	0.83	1.87	0.79	25° C.
Thiosinamin	1 : 100	0.40	0.08	0.008	
"	5 : 100	1.90	0.35	0.05	
"	10 : 100	3.90	0.72	0.09	

TABLE OF EQUIVALENT QUANTITIES OF SOME HALOIDS USED IN PHOTOGRAPHY.

CALCULATED FOR THE ANHYDROUS AND DRY SALTS.

By A. B. AUBERT, Professor of Chemistry, Maine State College, Orono, Me.

†EQUIVALENT QUANTITIES OF VARIOUS CHLORIDES USED IN PHOTOGRAPHY.

Sodium Chloride.	Potassium Chloride.	Ammonium Chloride.	Lithium Chloride.	Cadmium Chloride.
1	1.275	0.914	0.726	1.564
0.784	1	0.717	0.569	1.226
1.093	1.394	1	0.794	1.710
1.376	1.755	1.258	1	2.152
0.639	0 818	0.584	0.464	1

†EQUIVALENT QUANTITIES OF VARIOUS BROMIDES USED IN PHOTOGRAPHY.

Bromine.	Ammonium Bromide.	Potassium Bromide.	Sodium Bromide.	Cadmium Bromide + 4 Equi. Water.	Zinc Bromide.
1	1.225	1.488	1.287	2.150	1.406
0.816	1	1.214	1.055	1.754	1.147
0.672	0.823	1	0.865	1.445	0.945
0.777	0.952	1.156	1	1.671	1.092
0.465	0.570	0.692	0.599	1	0.654
0.711	0.871	1 058	0.915	1.529	1

†EQUIVALENT QUANTITIES OF VARIOUS IODIDES USED IN PHOTOGRAPHY.

Iodine.	Ammonium Iodide.	Potassium Iodide.	Sodium Iodide.	Cadmium Iodide.	Zinc Iodide.
1	1.142	1.307	1.181	1.441	1.255
0.876	1	1.145	1.035	1.262	1.099
0.765	0.874	1	0.903	1.102	0.960
0.847	0.967	1.107	1	1.220	1.063
0.694	0.793	0.907	0.820	1	0.871
0.797	0.910	1.042	0.941	1.148	1

†EQUIVALENT QUANTITIES OF VARIOUS SILVER SALTS USED IN PHOTOGRAPHY.

Silver (Metallic).	Nitrate.	Chloride.	Bromide.	Iodide.
1	1.574	1.328	1.741	2.176
0.6353	1	0.844	1.106	1.382
0.7523	1.184	1	1.310	1.638
0.5744	0.904	0.763	1	1.250
0.4595	0.723	0.610	0.800	1

†EQUIVALENT QUANTITES OF VARIOUS GOLD SALTS USED IN PHOTOGRAPHY.

Gold (Metallic).	Chloride.	Double Chloride of Gold and Potassium.	Double Chloride of Gold and Sodium.
1	1.542	2.1048	2.0229
0.6485	1	1.3645	1.3119
0.4751	0.7326	1	0.9611
0.4943	0.7623	1.0405	1

† Translated and partly recalculated from the "Agenda du Chimiste."

ACKLAND'S TABLES FOR THE SIMPLIFICATION OF EMULSION CALCULATIONS.

No. 1.

	Equivalent weights.	Weight of $AgNO_3$ required to convert one grain of soluble haloid.	Weight of soluble haloid required to convert one grain $AgNO_3$.	Weight of silver haloid produced by one grain of soluble haloid.	Weight of soluble haloid required to produce one grain of silver haloid.	Weight of silver haloid produced from one grain $AgNO_3$.
Ammonium bromide	98	1.734	.576	1.918	.521	
Potassium "	119.1	1.427	.700	1.578	.633	
Sodium "	103	1.650	.606	1.825	.548	1.106
Cadmium " com.	172	.988	1.012	1.093	.915	
" " anh.	136	1.25	.800	1.382	.723	
Zinc "	112.1	1.509	.663	1.670	.600	
Ammonium chloride	53.5	3.177	.315	2.682	.373	.844
Sodium "	58.5	2.906	.344	2.453	.408	
Ammonium iodide	145	1.172	.853	1.620	.617	
Potassium "	166.1	1.023	.977	1.415	.707	1.382
Sodium "	150	1.133	.882	1.566	.638	
Cadmium "	183	.929	1.076	1.284	.778	

Table No. 1 presents the actual weights of haloid or silver, as the case may be, required to convert or combine with one grain of another.

In order to make (say) ten ounces of emulsion by a new formula, which, for the sake of showing the working of the table, we will write down as follows :

Bromide of potassium..... .....150 grains.
Iodide of potassium..... 10 "
Chloride of ammonium..... 10 "
Gelatine.....200 "

we want to know how much silver nitrate should be employed in sensitizing this mixture. For this purpose we use the first column, in which we find against each haloid the exact quantity of silver nitrate required to fully decompose one grain. Taking, then, the figures we find in column No. 1 against the three salts in the above formula, and multiplying them by the number of grains of each used, we have the following sum :

Potassium bromide.....150 × 1.427 = 214
" iodide..... 10 × 1.023 = 10.23
Chloride of ammonium..... 10 × 3.177 = 31.77
} Weight silver nitrate required.

or the total quantity of silver nitrate required for full conversion, 256.00 grains.



By WM. J. CASSARD

LILIES OF THE VALLEY

No. 2.

	Ammonium bromide.	Potassium bromide.	Sodium bromide.	Cadmium bromide. (Coml.)	Cadmium bromide. (Anhyd.)	Zinc bromide.	Ammonium chloride.	Sodium chloride.	Ammonium iodide	Potassium iodide.	Sodium iodide.	Cadmium iodide.
Ammonium bromide	**1**	.823	.951	.57	.72	.87	1.832	1.675	.676	.59	.653	.535
Potassium "	1.215	**1**	1.156	.692	.876	1.058	2.226	2.036	.821	.717	.794	.651
Sodium "	1.051	.865	**1**	.599	.757	.915	1.925	1.761	.71	.62	.686	.563
Cadmium " com.	1.755	1.444	1.67	**1**	1.265	1.527	3.215	2.94	1.186	1.035	1.146	.94
" " anh.	1.387	1.141	1.32	.79	**1**	1.207	2.542	2.324	.938	.819	.906	.743
Zinc "	**1.149**	.945	1.093	.655	.828	**1**	2.104	1.925	.776	.678	.75	.615
Ammonium chloride.....	.546	.449	.519	.311	.393	.475	**1**	.914	.369	.322	356	.292
Sodium "	.597	.491	.568	.34	.43	.519	1.093	**1**	.403	.352	.39	.319
Ammonium iodide	1.479	1.217	1.408	.843	1.066	1.287	2.712	2.478	**1**	.873	.966	.792
Potassium "	1.695	1.394	1.612	.965	1.221	1.475	3.104	2.839	1.145	**1**	1.107	.907
Sodium "	1.53	1.259	1.456	.872	1.103	1.332	2.803	2.564	1.034	.903	**1**	.819
Cadmium "	1.867	1.536	1.776	1.064	1.345	1.625	3.42	3.128	1.262	1.102	1.22	**1**

TABLE No. 2 gives in separate columns the relative converting values of each of the soluble haloid salts in ordinary use, showing how much of any salt must be used to replace one grain of any other. In each column will be found a unit (printed in larger type) which represents one grain of the salt named at the head of the column; the other figures in the same column show the exact quantities of the other salts which must be used in lieu of a single grain of that particular haloid. Thus, taking the first column, which is headed "Ammonium Bromide," we find against ammonium bromide in the margin the figure 1, representing one grain of that salt. If we wish to know the relative converting power of potassium bromide we take the number in the same column which stands against the latter salt in the margin, viz., 1.215; that is to say, 1.215 grain of potassium bromide will be required to do the same work as one of NH_4 Br.

TABLE OF THE RELATIVE SOLUBILITY OF THE CHLORID, BROMID AND IODID OF SILVER.

From Comptes Rendus des Séances de l' Academie des Sciences de Vienne. E. VALENTA. Translated by D. W. COLBY, Maine State College, Orono.

SOLVENT.	CONCENTRATION.	100 GRAMMES OF SOLUTION DISSOLVE IN GRMS.			REMARKS.
		Ag Cl	Ag Br	Ag I	
Sodium Thiosulfite.	1:100	0.40	0.35	0.03	The determinations of solubility were made at 20 deg. C.
....	5:100	2.00	1.90	0.15	
....	10:100	4.10	3.50	0.30	
....	15:100	5.50	4.20	0.40	
....	20:100	6 10	5.80	0.60	
Ammonium Thiosulfite.	1:100	0.57	....	....	The bromid and iodid of silver dissolve as in sodium thiosulfite.
....	5:100	1.32	....	....	
....	10:100	3.92	....	....	
Sodium Sulfite.	10:100	0.44	0.04	0.01	at 25 deg. C.
....	20:100	0.95	0.08	0 02	
Ammonium Sulfite.	10:100	traces	traces	traces	
Ammonium Carbonate.	10:100	0.05	....	....	
Ammonia.	3 per ct.	1.40	....	....	
....	15 per ct.	7 58	....	....	
Magnesium Chlorid.	50:100	0.50	....	....	
Potassium Cyanid.	5:100	2.75	6.55	8.23	at 25 deg. C.
Ammonium Sulfocyanid.	5:100	0.08	0.21	0.02	at 20 deg. C.
.... ..	10:100	0.54	2.04	0.08	
....	15:100	2.88	5.30	0.13	
Potassium Sulfocyanid.	10:100	0.11	0.73	....	at 25 deg. C.
Calcium Sulfocyanid.	10:100	0.15	0.53	0.03	
Barium Sulfocyanid.	10:100	0.20	0.35	0 02	
Aluminum Sulfocyanid.	10:100	2.02	4.50	0.02	
Thiocarbamide.	10:100	0.83	1.87	0.79	at 25 deg. C.
Thiosinnamine.	1:100	0.40	0.08	0.08	
....	5:100	1.90	0.35	0.05	
....	10:100	3.90	0.72	0.09	

On looking over these figures one sees immediately, that the chemical equations representing the solution of the haloid salts of silver, do not accord with the facts. The solution of silver chlorid, for example, in sodium thiosulfite should take place after the following equation:

$$Na_2S_2O_3 + 2AgCl = Ag_2S_2O_3 + NaCl$$

The figures given by experiment are not exactly in concordance with the equation. Furthermore in replacing in that formula AgCl by AgBr or AgI we find a still more marked difference, for by the table the silver iodid is nearly ten times less soluble than the chlorid or bromid.

The most energetic solvent for the silver salts is without doubt the cyanid of potassium. This dissolves with great readiness the chlorid, bromid and iodid of silver. In this case also theory does not accord with practice. The solution in cyanid takes place after the following equation:

$$KCy + AgCl\,(Br \text{ or } I) = AgCy + KCl\,(Br \text{ or } I)$$

The cyanid of potassium acts in a different manner from the sodium thiosulfite. In the thiosulfite the solubility is greatest in the chlorid, diminishing to the iodid; on the contrary for the cyanid it is least for the chlorid, increasing to the iodid.

Following from this it is best to use the potassium cyanid as a fixing agent in case any great amount of the iodid of silver is present.

ELSDEN'S TABLE OF POISONS AND ANTIDOTES.

	Poisons.	Remarks.	Characteristic Symptoms.	Antidote.
Caustic Vegetable Acids.	Oxalic Acid. including Potassium Oxalate.	1 dram is the smallest fatal dose known.	Hot, burning sensation in throat and stomach; vomiting, cramps, and numbness.	Chalk, whiting or magnesia, suspended in water. Plaster or mortar can be used in emergency.
Caustic Alkalies.	Ammonia. Potash. Soda.	Vapor of ammonia may cause inflammation of the lungs.	Swelling of tongue, mouth, and fauces; often followed by stricture of the œsophagus.	Vinegar and water.
Metallic Salts.	Mercuric Chloride.	3 grains the smallest known fatal dose.	Acrid, metallic taste, constriction and burning in throat and stomach, followed by nausea and vomiting.	White and yolk of raw eggs with milk. In emergency, flour paste may be used.
	Acetate of Lead.	The sub-acetate is still more poisonous.	Constriction in the throat and at pit of stomach; crampy pains and stiffness of abdomen; blue line round the gums.	Sulphates of soda or magnesia. Emetic of sulphate of zinc.
	Cyanide of Potassium.	*a*. Taken internally, 3 grs. fatal.	Insensibility, slow, gasping respiration, dilated pupils, and spasmodic closure of the jaws.	No certain remedy; cold affusion over the head and neck most efficacious.
		b. Applied to wounds and abrasures of the skin.	Smarting sensation.	Sulphate of iron should be applied immediately.
	Bichromate of Potassium	*a*. Taken internally. *b*. Applied to slight abrasions of the skin.	Irritant pain in stomach, and vomiting. Produces troublesome sores and ulcers.	Emetics and magnesia, or chalk.
	Nitrate of Silver.		Powerful irritant.	Common salt to be given immediately, followed by emetics.
Concentrated Mineral Acids.	Nitric Acid.	2 drams have been fatal. Inhalation of the fumes has also been fatal.	Corrosion of windpipe and violent inflammation.	Bicarbonate of soda, or carbonate of magnesia or chalk, plaster of the apartment beaten up in water.
	Hydrochloric Acid. Sulphuric Acid.	½ ounce has caused death. 1 dram has been fatal.		

Acetic Acid, concentrated, has as powerful an effect as the mineral acids.

Iodine.	Variable in its action; 3 grains have been fatal.	Acrid taste, tightness about the throat, vomiting.	Vomiting should be encouraged, and gruel, arrowroot and starch given freely.
Ether.	When inhaled.	Effects similar to chloroform.	Cold affusion and artificial respiration.
Pyrogallol.	2 grains sufficient to kill a dog.	Resemble phosphorus poisoning.	No certain remedy. Speedy emetic desirable.

UNITED STATES WEIGHTS AND MEASURES.

ACCORDING TO EXISTING STANDARDS.

LINEAL.

	Inches.	Feet.	Yards.	Rods.	Fur's.	Mile.
12 inches = 1 foot.	12 =	1				
3 feet = 1 yard.	36 =	3 =	1			
5.5 yards = 1 rod.	198 =	16.5 =	5.5 =	1		
40 rods = 1 furlong.	7,920 =	660 =	220 =	40 =	1	
8 furlongs = 1 mile.	63,360 =	5,280 =	1,760 =	320 =	8 =	1

SURFACE—LAND.

	Feet.	Yards.	Rods.	Roods.	Acres.
144 sq. ins. = 1 sq. ft.	9 =	1			
9 sq. ft. = 1 sq. yard.	272.25 =	30.25 =	1		
30.25 sq. yds. = 1 sq. rod.	10,890 =	1,210 =	40 =	1	
40 sq. rods = 1 sq. rood.	43,560 =	4,840 =	160 =	4 =	1
4 sq. roods = 1 acre.	27,878,400 =	3,097,600 =	102,400 =	2,560 =	640
640 acres = 1 sq. mile.					

VOLUME—LIQUID.

	Gills.	Pints.	Gallon.	Cub. In.
4 gills = 1 pint.	32 =	8 =	1 =	231
2 pints = 1 quart.				
4 quarts = 1 gallon.				

FLUID.

Gallon.	Pints.	Ounces.	Drachms.	Minims.	Cubic Centimetres.
1 =	8 =	128 =	1,024 =	61,440 =	3,785.435
	1 =	16 =	128 =	7,680 =	473.179
		1 =	8 =	480 =	29.574
			1 =	60 =	3.697

16 ounces, or a pint, is sometimes called a fluid pound.

TROY WEIGHT.

Pound.	Ounces.	Pennyweights.	Grains.	Grams.
1 =	12 =	240 =	5,760 =	373.24
	1 =	20 =	480 =	31.10
		1 =	24 =	1.56

APOTHECARIES' WEIGHT.

lb.	℥	ʒ	℈	gr.	
Pound.	Ounces.	Drachms.	Scruples.	Grains.	Grams.
1 =	12 =	96 =	288 =	5,760 =	373.24
	1 =	8 =	24 =	480 =	31.10
		1 =	3 =	60 =	3.89
			1 =	20 =	1.30
				1 =	.06

The pound, ounce, and grain are the same as in Troy weight.

AVOIRDUPOIS WEIGHT.

Pound.	Ounces.	Drachms.	Grains (Troy).	Grams.
1 =	16 =	256 =	7,000 =	453.60
	1 =	16 =	437.5 =	28.35
		1 =	27.34 =	1.77

ENGLISH WEIGHTS AND MEASURES.

APOTHECARIES' WEIGHT.

20 Grains = 1 Scruple = 20 Grains.
3 Scruples = 1 Drachm = 60 Grains.
8 Drachms = 1 Ounce = 480 Grains.
12 Ounces = 1 Pound = 5760 Grains.

FLUID MEASURE.

60 Minims = 1 Fluid Drachm
8 Drachms = 1 Fluid Ounce.
20 Ounces = 1 Pint.
8 Pints = 1 Gallon.

The above weights are usually adopted in formulas.

All Chemicals are usually sold by

AVOIRDUPOIS WEIGHT.

$27\frac{11}{32}$ Grains = 1 Drachm = $27\frac{11}{32}$ Grains.
16 Drachms = 1 Ounce = $437\frac{1}{2}$ Grains.
16 Ounces = 1 Pound = 7000 Grains.

Precious Metals are usually sold by

TROY WEIGHT.

24 Grains = 1 Pennyweight = 24 Grains.
20 Pennyweights = 1 Ounce = 480 Grains.
12 Ounces = 1 Pound = 5760 Grains.

NOTE.—An ounce of metallic silver contains 480 grains, but an ounce of nitrate of silver contains only $437\frac{1}{2}$ grains.

UNITED STATES FLUID MEASURE.

Gal.	Pints.	Ounces.	Drachms.	Mins.	Cub. In.	Grains.	Cub. C.M.
1 =	8 =	128 =	1,024 =	61,440 =	231. =	58,328.886 =	3,785.44
1 =	16 =	128 =	7,680 =	28.875 =	7,291.1107 =	473.18	
1 =	8 =	480 =	1.8047 =	455.6944 =	29.57		
1 =	60 =	0.2256 =	56.9618 =	3.70			

IMPERIAL BRITISH FLUID MEASURE.

Gal.	Pints.	Ounces.	Drachms.	Mins.	Cub. In.	Grains.	Cub. C.M.
1 =	8 =	160 =	1,280 =	76,800 =	277.27384 =	70,000 =	4,543.732
1 =	20 =	160 =	9,600 =	34.65923 =	8,750 =	567.966	
1 =	8 =	480 =	1.73296 =	437.5 =	28.398		
1 =	60 =	0.21662 =	54.69 =	3.550			

METRIC SYSTEM OF WEIGHTS AND MEASURES.

MEASURES OF LENGTH.

Denominations and Values.		Equivalents in Use.
Myriameter	10,000 meters.	6.2137 miles.
Kilometer	1,000 meters.	.62137 mile, or 3,280 ft. 10 in.
Hectometer	100 meters.	328. feet and 1 inch.
Dekameter	10 meters.	393.7 inches.
Meter	1 meter.	39.37 inches.
Decimeter	1-10th of a meter.	3.937 inches.
Centimeter	1-100th of a meter.	.3937 inch.
Millimeter	1-1000th of a meter.	.0394 inch.

MEASURES OF SURFACE.

Denominations and Values.		Equivalents in Use.
Hectare	10,000 square meters.	2.471 acres.
Are	100 square meters.	119.6 square yards.
Centare	1 square meter.	1,550. square inches.

MEASURES OF VOLUME.

Denominations and Values.			Equivalents in Use.	
Names.	No. of Liters.	Cubic Measures.	Dry Measure.	Wine Measure.
Kiloliter or stere	1,000	1 cubic meter.	1.308 cubic yards.	264.17 gallons.
Hectoliter	100	1-10th cubic meter.	2 bu. and 3.35 pecks.	26.417 gallons.
Dekaliter	10	10 cubic decimeters.	9.08 quart.	2.6417 gallons.
Liter	1	1 cubic decimeter.	.908 quart.	1.0567 quarts.
Deciliter	1-10	1-10th cubic decimeter.	6.1023 cubic inches.	.845 gill.
Centiliter	1-100	10 cubic centimeters.	.6102 cubic inch.	.338 fluid oz.
Milliliter	1-1000	1 cubic centimeter.	.061 cubic inch.	.27 fl. drm.

WEIGHTS.

Denominations and Values.			Equivalents in Use.
Names.	Number of Grams.	Weight of Volume of Water at its Maximum Density.	Avoirdupois Weight.
Millier or Tonneau	1,000,000	1 cubic meter.	2204.6 pounds.
Quintal	100,000	1 hectoliter.	220.46 pounds.
Myriagram	10,000	10 liters.	22.046 pounds.
Kilogram or Kilo	1,000	1 liter.	2.2046 pounds.
Hectogram	100	1 deciliter.	3.5274 ounces.
Dekagram	10	10 cubic centimeters.	.3527 ounce.
Gram	1	1 cubic centimeter.	15.432 grains.
Decigram	1-10	1-10th of a cubic centimeter.	1.5432 grain.
Centigram	1-100	10 cubic millimeters.	.1543 grain.
Milligram	1-1000	1 cubic millimeter.	.0154 grain.

For measuring surfaces, the square dekameter is used under the term of ARE; the hectare, or 100 ares, is equal to about 2½ acres. *The unit of capacity* is the cubic decimeter or LITER, and the series of measures is formed in the same way as in the case of the table of lengths. The cubic meter is the unit of measure for solid bodies, and is termed STERE. *The unit of weight* is the GRAM, which is the weight of one cubic centimeter of pure water weighed in a vacuum at the temperature of 4 deg. Cent. or 39.2 deg. Fahr., which is about its temperature of maximum density. In practice, the term cubic centimeter abbreviated c.c, is generally used instead of milliliter, and cubic meter instead of kiloliter.

METRIC SYSTEM OF WEIGHTS AND MEASURES.

THE meter is a measure of length equal to 39.370 English or American inches, a standard of linear measure supposed to be the ten-millionth part of the distance from the equator to the north pole, as ascertained by actual measurement of an arc of the meridian.

This system, formed on the meter as the unit of length, has four other leading units, all connected with and dependent upon this. Hence, we have:

1. The meter, which is the unit of measures of length.

2. The are, which is the unit of surface, and is the square of the meter.

3. The liter, which is the unit of measures of capacity, and is the cube of a tenth part of the meter.

4. The stere, which is the unit of measures of solidity, having the capacity of a cubic meter.

5. The gram, which is the unit of measures of weight, and is the weight of that quantity of distilled water at its maximum density, fills the cube of a hundredth part of the meter.

Each unit has its decimal multiples and sub-multiples, that is weights and measures ten times larger, or ten times smaller, than the principal units. The prefixes denoting multiples are derived from the Greek, and are: Deka, ten; hecto, hundred; kilo, thousand; and myria, ten thousand. Those denoting sub-multiples are taken from the Latin, and are: Deci, ten; centi, hundred (as in centigram or centimeter); and milli, thousand.

The metric system has been adopted by many nations, the English excepted. In America its use has been made optional, but is legalized by Congress. All photographic formulas received from the continent of Europe express values and quantities with metrical weights and measures. To utilize them directly without translating into the expressions of the English system, the student is advised to procure gram weights and cubic centimeter graduates, and substitute them for those denoting quantities according to the old plan.

As an assistance to those who cannot acquire these aids, we annex tables, which convert grams and cubic centimeters into English grains, drachms, and ounces sufficiently correct for practical purposes.

METRIC FLUID MEASURES.

The cubic centimeter, usually represented by "C.c.," is the unit of the metric measurement for liquids. It contains 17 minims of water. The weight of this quantity of water is 1 gram. The following table will prove to be sufficiently accurate for photographic purposes:

THE CONVERSION OF FRENCH (METRIC) INTO ENGLISH MEASURE.

1	cubic centimeter	=	17	minims.					
1	cubic centimeters	=	34	"					
3	"	=	51	"					
4	"	=	68	"	or	1	dram	8	minims.
5	"	=	85	"	"	1	"	25	"
6	"	=	101	"	"	1	"	41	"
7	"	=	118	"	"	1	"	58	"
8	"	=	135	"	"	2	drams	15	"
9	"	=	152	"	"	2	"	32	"
10	"	=	169	"	"	2	"	49	"
20	"	=	338	"	"	5	"	38	"
30	"	=	507	"	"	1	ounce	0 dram	27 minims
40	"	=	676	"	"	1	"	3 drams	16 "
50	"	=	845	"	"	1	"	6 "	5 "
60	"	=	1014	"	"	2	ounces	0 "	54 "
70	"	=	1183	"	"	2	"	3 "	43 "
80	"	=	1352	"	"	2	"	6 "	32 "
90	"	=	1521	"	"	3	"	1 "	21 "
100	"	=	1690	"	"	3	"	4 "	10 "
1000	"	=	1 liter = 34 fluid ounces nearly, or $2\frac{1}{8}$ pints.						

THE CONVERSION OF FRENCH (METRIC) INTO ENGLISH WEIGHT.

THE following table, which contains no error greater than one-tenth of a grain, will suffice for most practical purposes:

1	gram	=	$15\frac{2}{5}$	grains.					
2	grams	=	$30\frac{4}{5}$	"					
3	"	=	$46\frac{1}{5}$	"					
4	"	=	$61\frac{4}{5}$	"	..... or	1	dram	$1\frac{4}{5}$	grain.
5	"	=	$77\frac{1}{5}$	"	..... "	1	"	$17\frac{1}{5}$	grains.
6	"	=	$92\frac{3}{5}$	"	..... "	1	"	$32\frac{3}{5}$	"
7	"	=	108	"	..... "	1	"	48	"
8	"	=	$123\frac{2}{5}$	"	..... "	2	drams	$3\frac{2}{5}$	"
9	"	=	$138\frac{4}{5}$	"	..... "	2	"	$18\frac{4}{5}$	"
10	"	=	$154\frac{2}{5}$	"	..... "	2	"	$34\frac{2}{5}$	"
11	"	=	$169\frac{4}{5}$	"	..... "	2	"	$49\frac{4}{5}$	"
12	"	=	$185\frac{1}{5}$	"	..... "	3	"	$5\frac{1}{5}$	"
13	"	=	$200\frac{3}{5}$	"	..... "	3	"	$20\frac{3}{5}$	"
14	"	=	216	"	..... "	3	"	36	"
15	"	=	$231\frac{2}{5}$	"	..... "	3	"	$51\frac{2}{5}$	"
16	"	=	247	"	..... "	4	"	7	"
17	"	=	$262\frac{3}{5}$	"	..... "	4	"	$22\frac{3}{5}$	"
18	"	=	$277\frac{4}{5}$	"	..... "	4	"	$37\frac{4}{5}$	"
19	"	=	$293\frac{1}{5}$	"	..... "	4	"	$53\frac{1}{5}$	"
20	"	=	$308\frac{3}{5}$	"	..... "	5	"	$8\frac{3}{5}$	"
30	"	=	463	"	..... "	7	"	43	"
40	"	=	$617\frac{1}{5}$	"	..... "	10	"	$17\frac{1}{5}$	"
50	"	=	$771\frac{3}{5}$	"	..... "	12	"	$51\frac{3}{5}$	"
60	"	=	926	"	..... "	15	"	26	"
70	"	=	$1080\frac{1}{5}$	"	..... "	18	"	$0\frac{1}{5}$	"
80	"	=	$1234\frac{3}{5}$	"	..... "	20	"	$34\frac{3}{5}$	"
90	"	=	1389	"	..... "	23	"	9	"
100	"	=	$1543\frac{1}{5}$	"	..... "	25	"	$43\frac{1}{5}$	"
1000	"	=	1 kilogram = 32 oz., 1 dr., $12\frac{2}{3}$ gr.						

THE CONVERSION OF METRIC INTO AMERICAN MEASURE.

By Nelson B. Sizer, B.Sc., M.D.

[From *The Photographic Times*, August 14, 1891.]

The following table is computed true to the nearest half grain or minim, as the case may be, so it will prove a sufficiently near approximation to the required metric equivalents.

U. S. P. Standard.

Gram, or c.cm.	Grains.	Minims.	Gram, or c.cm.	Grains.	Minims.
1	15½	16¼	15	231½	244
2	31	32½	16	247	260
3	46	49	17	262	276
4	62	65	18	278	292½
5	77	81	19	293	309
6	93	97½	20	308½	325
7	108	114	30	463	487½
8	123½	130	40	617	650
9	139	146	50	771½	813
10	154	162½	60	926	975½
11	170	179	70	1,080	1,138
12	185	194	80	1,234½	1,300½
13	201	211	90	1,389	1,463
14	216	227½	100	1,543	1,625½
..	....	.. .	1,000	15,432½	16,256½
..	....	...	....	1 kilo.	liter.

The "kilo" or kilogram, the 1,000 gram weight, is equal to 32 ounces $72\frac{2}{10}$ grains "Troy or Apothecaries" weight, or 2 pounds 3 ounces $119\frac{7}{10}$ grains Avoirdupois.

The "liter" or 1,000 cubic centimeters, or bulk of water that weighs 1 kilo, is equal to 2 pints 1 fluid ounce and $415\frac{3}{10}$ minims, U. S. P. Standard, or our glass graduates as commonly sold by reliable houses.

The grains and minims are easily reduced to fluid drachms and fluid ounces, or drachms and ounces Troy, by my readers, if they will only remember that 60 grains or minims go to the solid or fluid drachm, and 480 grains or minims, or 8 drachms solid or fluid, go to each U. S. P. ounce, solid or fluid.

Thus the table gives the value of 90 grams as 1,389 grains, of 90 cubic centimeters as 1,463 minims. How many ounces in each?

Dividing 1,389 by 60 for drachms, we have 23 drachms 9 grains. As 8 drachms go to the ounce, there are 2 ounces in the 23 drachms and 7 drachms over, so we have—in 1,389 grains there are 2 ounces 7 drachms 9 grains. In the same way we find 3 fluid ounces and 23 minims over, to be the value of 90 cubic centimeters or 1,463 minims.

TABLE SHOWING THE COMPARISON OF THE READINGS OF THERMOMETERS.

CELSIUS, OR CENTIGRADE (C). RÉAUMUR (R). FAHRENHEIT (F).

C.	R.	F.	C.	R.	F.
—30	—24.0	—22.0	23	18.4	73.4
—25	—20.0	—13.0	24	19.2	75.2
—20	—16.0	— 4.0	25	20.0	77.0
—15	—12.0	+ 5.0	26	20.8	78.8
—10	— 8.0	14.0	27	21.6	80.6
— 5	— 4.0	23.0	28	22.4	82 4
— 4	— 3.2	24.8	29	23.2	84.2
— 3	— 2.4	26.6	30	24.0	86.0
— 2	— 1.6	28.4	31	24.8	87.8
— 1	— 0.8	30.2	32	25.6	89.6
			33	26.4	91.4
Freezing point of water.			34	27.2	93.2
			35	28.0	95.0
0	0.0	32.0	36	28.8	96.8
1	0.8	33.8	37	29.6	98.6
2	1.6	35.6	38	30.4	100.4
3	2.4	37.4	39	31.2	102.2
4	3.2	39.2	40	32.0	104.0
5	4.0	41.0	41	32.8	105.8
6	4.8	42.8	42	33.6	107.6
7	5.6	44.6	43	34.4	109.4
8	6.4	46.4	44	35.2	111.2
9	7.2	48.2	45	36.0	113.0
10	8.0	50.0	50	40.0	122.0
11	8.8	51.8	55	44.0	131.0
12	9.6	53.6	60	48.0	140.0
13	10.4	55.4	65	52.0	149.0
14	11.2	57.2	70	56.0	158.0
15	12.0	59.0	75	60.0	167.0
16	12.8	60.8	80	64.0	176.0
17	13.6	62.6	85	68.0	185.0
18	14.4	64.4	90	72.0	194.0
19	15.2	66.2	95	76.0	203.0
20	16.0	68.0	100	80.0	212.0
21	16.8	69.8			
22	17.6	71.6	Boiling point of water.		

Readings on one scale can be changed into another by the following formulæ, in which $t°$ indicates degrees of temperature:

Réau. to Fahr.

$$\frac{9}{4}t° \text{ R} + 32° = t° \text{ F}$$

Réau. to Cent.

$$\frac{5}{4}t° \text{ R} = t° \text{ C}$$

Cent. to Fahr.

$$\frac{9}{5}t° \text{ C} + 32° = t° \text{ F}$$

Cent. to Réau.

$$\frac{4}{5}t° \text{ C} = t° \text{ R}$$

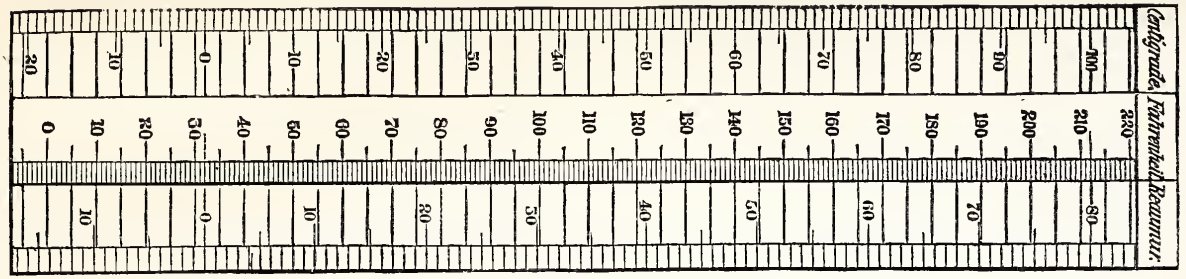
Fahr. to Cent.

$$\frac{5}{9}\left(t° \text{ F} - 32°\right) = t° \text{ C}$$

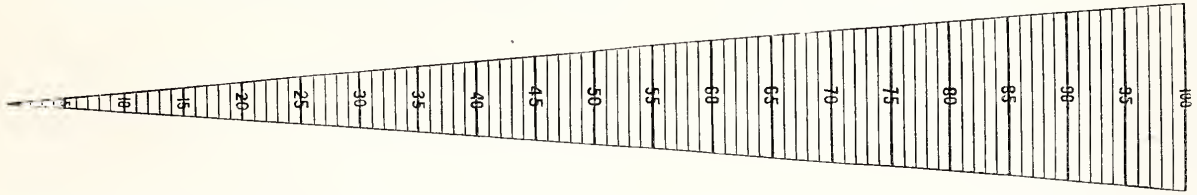
Fahr. to Réau.

$$\frac{4}{9}\left(t° \text{ F} - 32\right) = t° \text{ R}$$

THERMOMETER SCALES.



SCALE FOR MEASURING DIAMETERS OF STOPS FOR LENSES.



Each cross line varies in length from the adjacent one by $\frac{1}{100}$th of an inch.

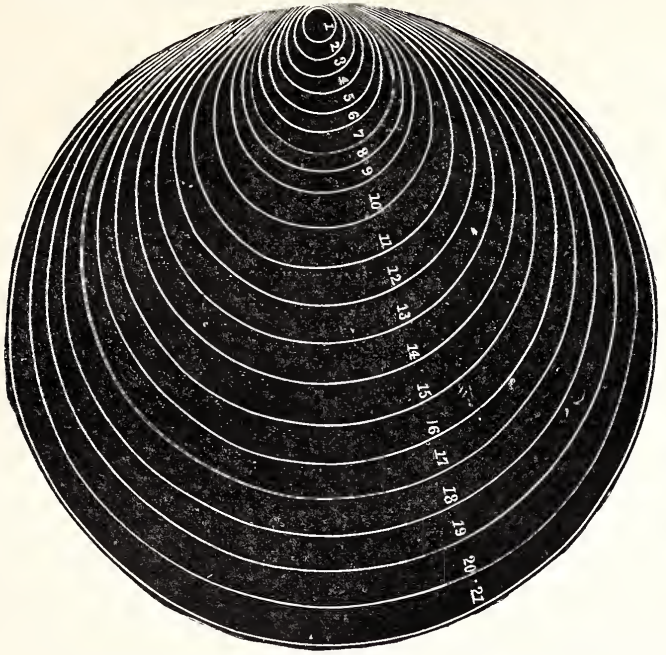
To use: Lay the stop flat on this scale, and select the cross line which is of the same length as the greatest diameter of the opening; read this off, by means of the figures, which will be the measurements in $\frac{1}{100}$ths of an inch. The equivalent focal length of lens, divided by this measurement of the stop opening, will give the fraction expressing the ratio of aperture to focal length. The rapidity of different lenses, or of the same lens with different stops, is proportional to the squares of these ratios.

"UNIFORM SYSTEM" NUMBERS FOR STOPS FROM $\frac{f}{1}$ TO $\frac{f}{100}$.

In the following table Mr. S. A. Warburton has calculated the exposure necessary with every stop from $\frac{f}{1}$ to $\frac{f}{100}$ compared with the unit stop of the "uniform system" of the Photographic Society of Great Britain. The figures which are underlined show in the first column what $\frac{f}{a}$ must be in order to increase the exposure in geometrical ratio from $\frac{f}{4}$, the intermediate numbers showing the uniform system number for any other aperture.

f	U. S. No.	f	U. S. No.	f	U. S. No.
1	$\frac{1}{16}$	15	14.06	58	210.25
$1\frac{1}{4}$	.097	16	16	59	217.56
1.414	$\frac{1}{8}$	17	18.06	60	225.00
$1\frac{1}{2}$	.140	18	20.25	61	232.56
$1\frac{3}{4}$	.191	19	22.56	62	240.25
2	$\frac{1}{4}$	20	25.00	63	248.06
$2\frac{1}{4}$	.316	21	27.56	64	256
$2\frac{1}{2}$	.390	22	30.25	65	264.06
2.828	$\frac{1}{2}$	22.62	32	66	272.25
$2\frac{3}{4}$	.472	23	33.06	67	280.56
3	.562	24	36.00	68	289.00
$3\frac{1}{4}$	.660	25	39.06	69	297.56
$3\frac{1}{2}$	.765	26	42.25	70	306.25
$3\frac{3}{4}$	.878	27	45.56	71	315.06
4	1.00	28	49.00	72	324.00
$4\frac{1}{4}$	1.12	29	52.56	73	333.06
$4\frac{1}{2}$	1.26	30	56.25	74	342.25
$4\frac{3}{4}$	1.41	31	60.06	75	351.56
5	1.56	32	64	76	361.00
$5\frac{1}{4}$	1.72	33	68.06	77	370.56
$5\frac{1}{2}$	1.89	34	72.25	78	380.25
5.656	2	35	76.56	79	390.06
$5\frac{3}{4}$	2.06	36	81.00	80	400.00
6	2.25	37	85.56	81	410.06
$6\frac{1}{4}$	2.44	38	90.25	82	420.25
$6\frac{1}{2}$	2.64	39	95.06	83	430.56
$6\frac{3}{4}$	2.84	40	100.00	84	440.00
7	3.06	41	105.06	85	451.56
$7\frac{1}{4}$	3.28	42	110.25	86	462.25
$7\frac{1}{2}$	3.51	43	115.56	87	473.06
$7\frac{3}{4}$	3.75	44	121.00	88	484.00
8	4	45	126.56	89	495.06
$8\frac{1}{4}$	4.25	45.25	128	90	506.25
$8\frac{1}{2}$	4.51	46	132.25	90.50	512
$8\frac{3}{4}$	4.78	47	138.06	91	517.56
9	5.06	48	144.00	92	529.00
$9\frac{1}{4}$	5.34	49	150.06	93	540.56
$9\frac{1}{2}$	5.64	50	156.25	94	552.25
$9\frac{3}{4}$	5.94	51	162.56	95	564.06
10	6.25	52	169.00	96	576.00
11	7.56	53	175.56	97	588.06
11.31	8	54	182.25	98	600.25
12	9.00	55	189.06	99	612.56
13	10.56	56	196.00	100	625.00
14	12.25	57	203.06		

THE annexed diagram and table are intended to facilitate the calculation of the proper number with which to mark the diaphragms according to the Photographic Society of Great Britain's Uniform System, which will be found described on another page. This number it is proposed to call the "U. S." (or uniform system number). The numbered circles in the diagram represent the sizes of stops. The photographer, knowing the equivalent focus of his lens, looks along the line opposite the number which represents the circle nearest inside to his diaphragm, and when he gets to the column headed by that equivalent focus the number there found is the U. S. number to be marked on the diaphragm. For example: A lens of eight inches equivalent focus has a diaphragm in size about No. 5 on the diaphragm; running the eye along the line opposite No. 5 we find in the column under—"focus eight inches" the No. 11, which is the U. S. number required.



No. of Circle.	4 focus	5 focus	6 focus	7 focus	8 focus	9 focus	10 focus	12 focus	14 focus
1	25	39	56						
2	11	17	25	34	44	56	68		
3	6¼	10	14	19	25	31	40	56	
4	4	6¼	9	12	16	20	25	36	48
5	2¾	4¼	6¼	8½	11	14	17	25	34
6	2	3⅕	4½	6¼	8	10	13	18	25
7	1½	2½	3½	4¾	6	8	10	14	19
8	1¼	2	2¾	3¾	5	6¼	8	11	15
9	1	1⅕	2¼	3	4	5	6¼	9	12¼
10		1	1⅓	2⅕	2¾	3½	4⅕	6	8⅓
11			1¼	1⅓	2	2½	3⅕	5	6
12			⅞	1⅕	1¼	2	2½	3½	4¾
13				1	1⅓	1⅝	1⅜	2¾	4
14					1	1¼	1½	2¼	3
15						1	1⅓	1⅞	2½
16							1	1½	2
17								1⅓	7⅜
18								1⅛	1⅓
19								1	1⅓
20									1⅛
21									1

NOTE.—This table, taken from the "British Journal Photographic Almanac," has proved to be very convenient in the calculating of stop values.

EQUATIONS RELATING TO FOCI.

The following simple optical formulas and calculations, worked out by Mr. J. A. C. Branfill, for the *British Journal Almanac*, will prove useful in many branches of photography, especially where several lenses of varying foci are in constant use for a variety of purposes:

p = Principal focus.
F = Greater conjugate focus.
f = Lesser conjugate focus.
r = Ratio of any dimension in original to the same dimensions in copy (in case of reduction), or *vice versa* (in case of enlargement).
a = Diameter of aperture to lens.
x = Exposure required, assuming that $x = 1$ when $a = \frac{p}{4}$.

$$p = \frac{r\,(F+f)}{(r+1)^2}$$

$$f = p\left(\frac{1+r}{r}\right) = \frac{F+f}{r+1}$$

$$F = p\,(r+1) = rf$$

$$F+f = p \times \frac{(r+1)^2}{r} = p\,(2+r+\frac{1}{r})$$

$$r = \frac{F-p}{p} = \frac{p}{f-p} = \frac{F}{f}$$

$$x = \frac{f^2}{16\,a^2}$$

N. B.—For ordinary landscape work, where r is greater than 20, x may be taken as $\frac{p^2}{16\,a^2}$

Note.—In case the above may not he clear to some photographers, the following rules may be better understood:

To find the principal focus of a lens (p), focus a near object in the camera, and measure the distance hetween it and the ground glass ($F+f$); next find the proportion which any dimension in the object bears to the same dimension on the ground glass (r). Thus, if the original dimension be four times as large as its reproduction, we say that r equals (=) 4. Multiply $F+f$ by r, and divide the product hy the square of a number greater by one than r, that is by $(r+1)^2$. This rule was lately published by Mr. Debenham.

To find the lesser conjugate focus (f) (if p and r are known), multiply p by the sum of $r+1$ and divide the product hy r. Or divide $F+f$ by $r+1$.

To find the greater conjugate focus (F) multiply p by $r+1$. Or multiply f by r.

To find $F+f$ (the distance which the ground glass should be from the object to be copied in order to get a given value for r) multiply p by the sum of $r+\frac{1}{r}+2$.

To find r divide $F-p$ (the difference between F and p) by p. Or divide p hy $f-p$. Or divide F by f.

To find x divide the square of f by 16 times the square of a (the diameter of aperture to lens).

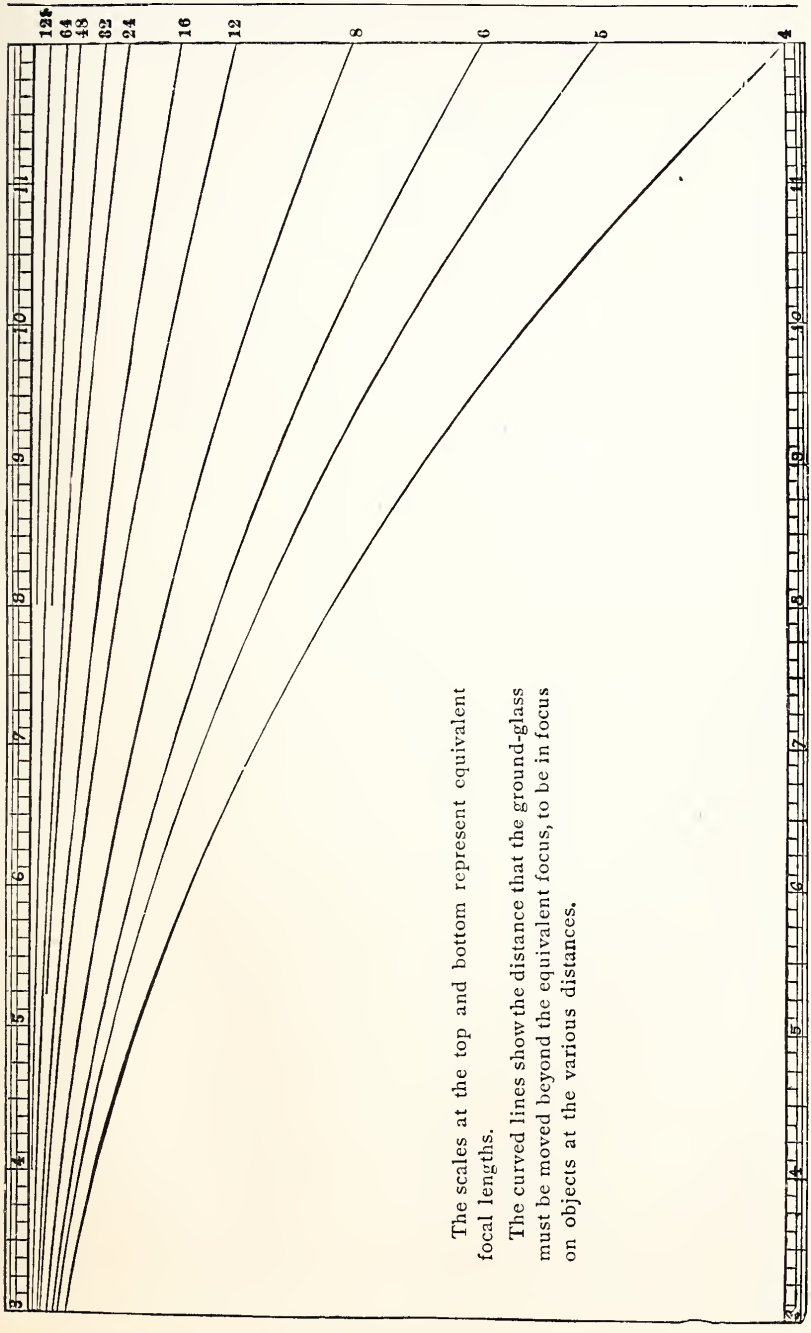
For example Focus an object which is five inches high, so that it is one inch high on the ground glass; thus we know that $r = 5$. Next measure the distance between the object and the ground glass ($F+f$), which is found to he 45 inches.

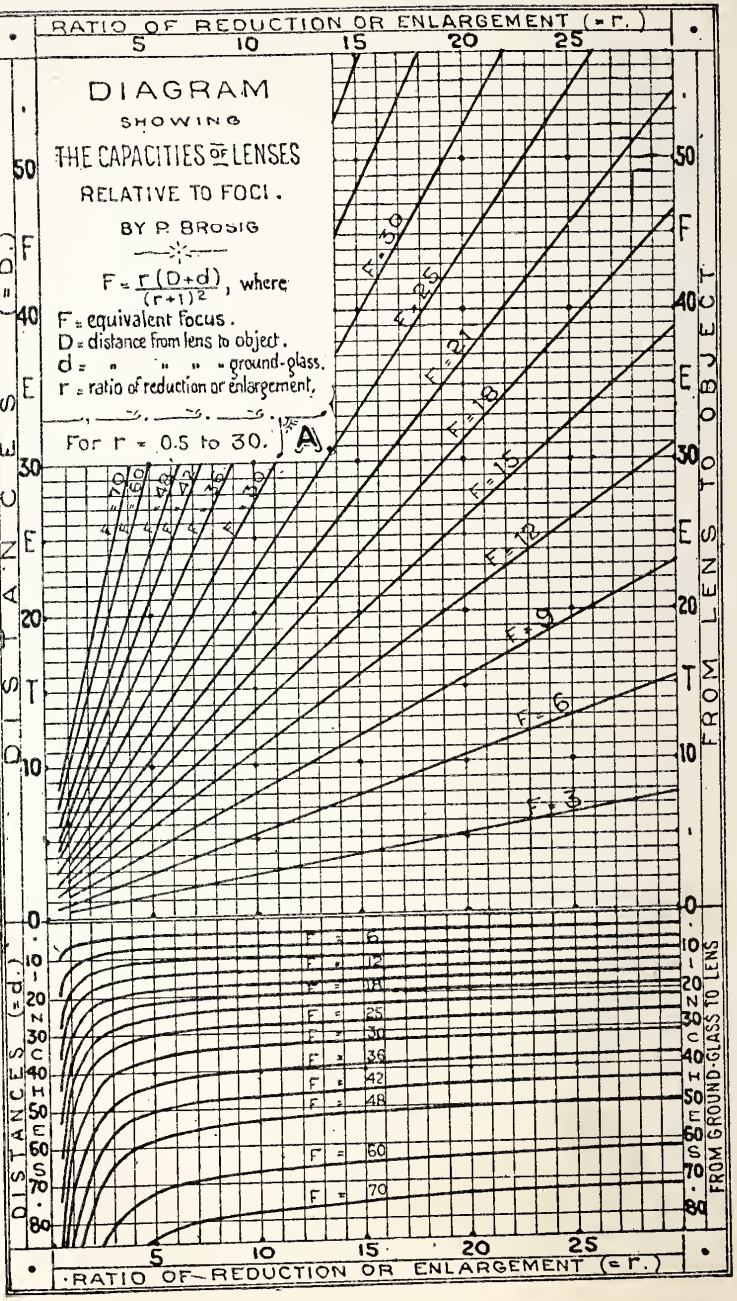
Then $p = 45 \times$ (multiplied by) $5 \div$ (divided hy) $6 \times 6 = 6\frac{1}{4}$ inches.
$f = 6\frac{1}{4} \times 6 \div 5 = 7\frac{1}{2}$ inches. Or $f = 45 \div 6 = 7\frac{1}{2}$ inches.
$F = 6\frac{1}{4} \times 6 = 37\frac{1}{2}$ inches. Or $F = 7\frac{1}{2} \times 5 = 37\frac{1}{2}$ inches.
$F+f = 6\frac{1}{4} \times (5+\frac{1}{5}+2) = 6\frac{1}{4} \times 7\frac{1}{5} = 45$ inches.
$r = (37\frac{1}{2} - 6\frac{1}{4}) \div 6\frac{1}{4} = 5$. Or $r = 6\frac{1}{4} \div (7\frac{1}{2} - 6\frac{1}{4}) = 5$.

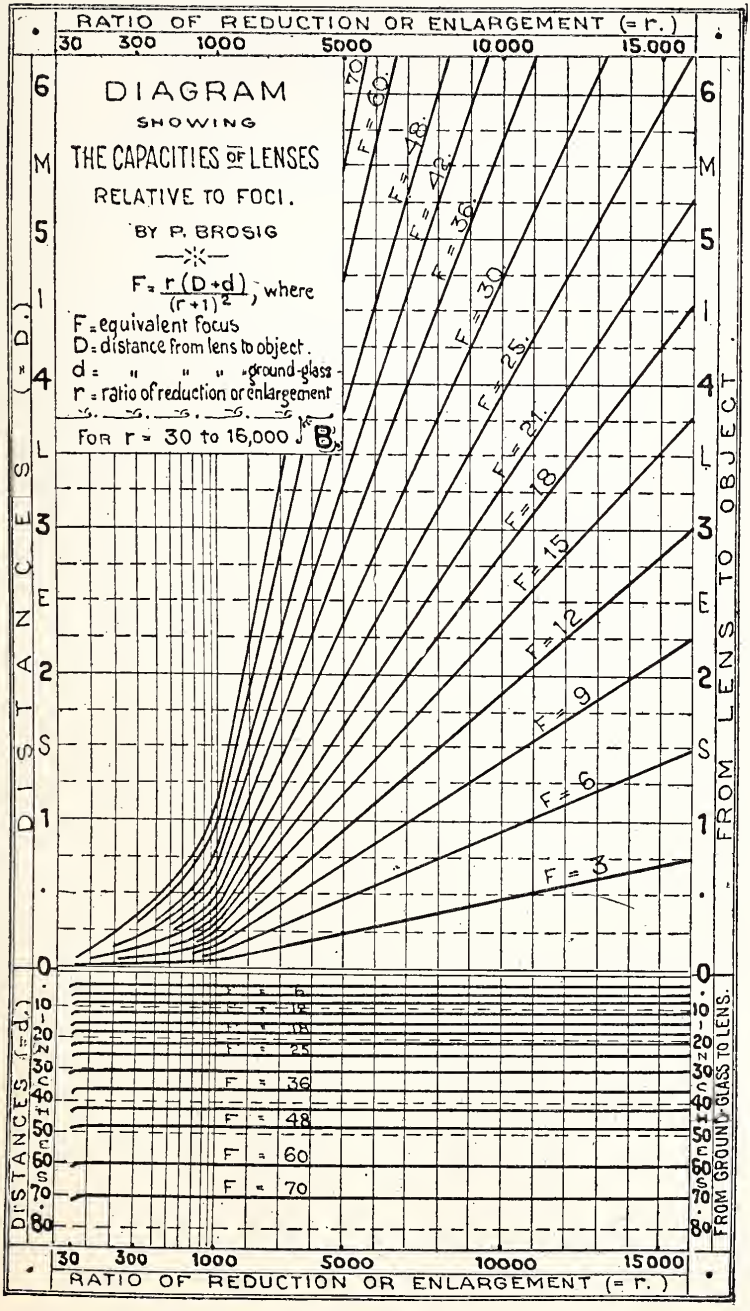
And x (the exposure required) will be $7\frac{1}{2} \times 7\frac{1}{2} \div (16 \times \frac{9}{16}) = 6\frac{1}{4}$; that is, the exposure will be $6\frac{1}{4}$ times as much as the exposure required with an aperture whose diameter equals $p \div 4$, assuming the aperture (a) to be $\frac{1}{4}$ inch diameter.

FOCUSING SCALES FOR ANY LENS OF FROM 3 TO 12 INCHES EQUIVALENT FOCUS.

Drawn by W. T. WINTRINGHAM.




RATIO OF REDUCTION OR ENLARGEMENT (= r.)
5 10 15 20 25
DIAGRAM
SHOWING
THE CAPACITIES OF LENSES
RELATIVE TO FOCI.
BY P. BROSIG
$F = \frac{r(D+d)}{(r+1)^2}$, where
F = equivalent Focus.
D = distance from lens to object.
d = " " " = ground-glass.
r = ratio of reduction or enlargement.
For r = 0.5 to 30.
A
F = 30
F = 24
F = 21
F = 18
F = 15
F = 12
F = 9
F = 6
F = 3
DISTANCES (= D.)
FROM LENS TO OBJECT.
F = 6
F = 12
F = 18
F = 25
F = 30
F = 36
F = 42
F = 48
F = 60
F = 70
DISTANCES (= d.)
FROM GROUND-GLASS TO LENS
INCHES
RATIO OF REDUCTION OR ENLARGEMENT (= r.)


RATIO OF REDUCTION OR ENLARGEMENT (= r.)
30 300 1000 5000 10000 15000
DIAGRAM
SHOWING
THE CAPACITIES OF LENSES
RELATIVE TO FOCI.
BY P. BROSIG
$F = \frac{r(D+d)}{(r+1)^2}$, where
F = equivalent focus
D = distance from lens to object.
d = " " " ground-glass
r = ratio of reduction or enlargement
FOR r = 30 to 16,000
DISTANCES (= D.) IN METRES
FROM LENS TO OBJECT.
DISTANCES (= d.) IN Centimetres
FROM GROUND-GLASS TO LENS.
F = 70
F = 60
F = 48
F = 36
F = 30
F = 25
F = 21
F = 18
F = 15
F = 12
F = 9
F = 6
F = 3

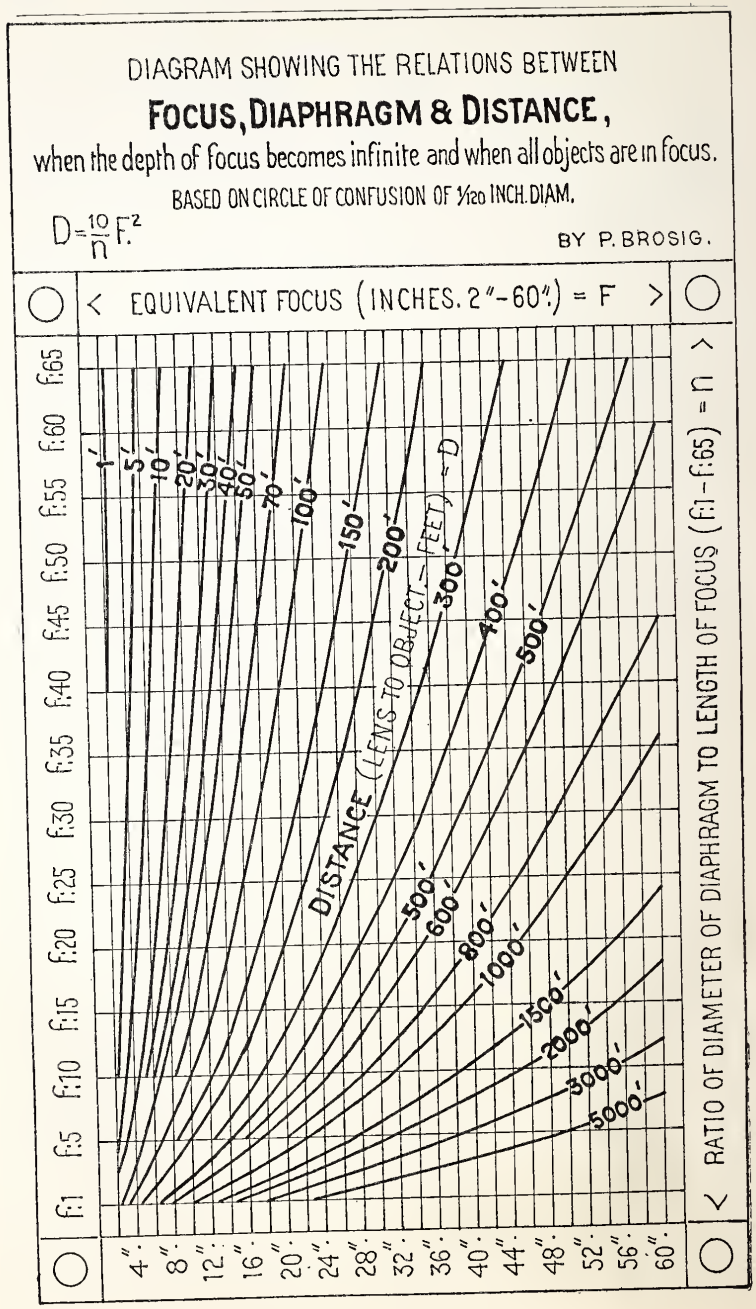

DIAGRAM SHOWING THE RELATIONS BETWEEN
FOCUS, DIAPHRAGM & DISTANCE,
when the depth of focus becomes infinite and when all objects are in focus.
BASED ON CIRCLE OF CONFUSION OF 1/20 INCH. DIAM.
$D=\frac{10}{n}F^2$
BY P. BROSIG.
EQUIVALENT FOCUS (INCHES. 2"-60".) = F
RATIO OF DIAMETER OF DIAPHRAGM TO LENGTH OF FOCUS (F:1-F:65) = n
F:1 F:5 F:10 F:15 F:20 F:25 F:30 F:35 F:40 F:45 F:50 F:55 F:60 F:65
4" 8" 12" 16" 20" 24" 28" 32" 36" 40" 44" 48" 52" 56" 60"
1' 5' 10' 20' 30' 40' 50' 70' 100' 150' 200' 300' 400' 500'
DISTANCE (LENS TO OBJECT - FEET) = D
500' 600' 800' 1000' 1500' 2000' 3000' 5000'

TABLE OF CONJUGATE FOCI, COMPUTED BY P. BROSIG, FOR AN OBJECT OF 68 INCHES HEIGHT.

EQUIV. FOCUS OF LENS INCHES.	HEIGHTS OF IMAGES (INCHES). 1″	2″	3″	4″	5″	6″	7″	8″	10″	12″	16″	20″	28″	36″	44″	52″	60″	68″
2″	138 2.0	70 2.1	47.3 2.1	36 2.1														
3″	207 3.0	105 3.1	71.0 3.1	54 3.2	43.8 3.2	37.0 3.3	32.1 3.3	NUMBERS ARE OMITED IN THIS SPACE										
4″	276 4.1	140 4.1	94.7 4.2	72 4.2	58.4 4.3	49.3 4.4	42.9 4.4	38.0 4.5	31.2 4.6	ON ACCOUNT OF THE WIDE ANGLE								
5″	345 5.1	175 5.1	118.3 5.2	90 5.3	73.0 5.4	61.7 5.4	53.6 5.5	47.5 5.6	39.0 5.7	33.3 5.9	OF LENS REQUIRED							
6″	414 6.1	210 6.2	142.0 6.3	108 6.4	87.6 6.4	74.0 6.5	64.3 6.6	57.0 6.7	46.8 6.9	40.0 7.1	31.5 7.4							
7″	483 7.1	245 7.2	165.7 7.3	126 7.4	102.2 7.5	86.3 7.6	75.0 7.7	66.5 7.8	54.6 8.0	46.7 8.2	36.7 8.6	30.8 9.1	(MORE THAN 90 DEGREES.)					
8″	552 8.1	280 8.2	189.3 8.4	144 8.5	116.8 8.6	98.7 8.7	85.7 8.8	76.0 8.9	62.4 9.2	53.3 9.4	42.0 9.9	35.2 10.4						
9″	621 9.1	315 9.3	213.0 9.4	162 9.5	131.4 9.7	111.0 9.8	96.4 9.9	85.5 10.1	70.2 10.3	60.0 10.6	47.2 11.1	39.6 11.6	30.9 12.7					
10″	690 10.1	350 10.3	236.7 10.4	180 10.6	146.0 10.7	123.3 10.9	107.1 11.0	95.0 11.2	78.0 11.5	66.7 11.8	52.5 12.4	44.0 12.9	34.3 14.1					
11″	759 11.2	385 11.3	260.3 11.5	198 11.6	160.6 11.8	135.7 12.0	117.9 12.1	104.5 12.3	85.8 12.6	73.3 12.9	57.7 13.6	48.4 14.2	37.7 15.5	31.8 16.8				
12″	828 12.2	420 12.4	284.0 12.5	216 12.7	175.2 12.9	148.0 13.1	128.6 13.2	114.0 13.4	93.6 13.8	80.0 14.1	63.0 14.8	52.8 15.5	41.1 16.9	34.7 18.4	30.6 19.8			
13″	897 13.2	455 13.4	307.7 13.6	234 13.8	189.8 14.0	160.3 14.1	139.3 14.3	123.5 14.5	101.4 14.9	86.7 15.3	68.2 16.1	57.2 16.8	44.6 18.4	37.6 19.9	33.1 21.4	30.0 22.9		
14″	966 14.2	490 14.4	331.3 14.6	252 14.8	204.4 15.0	172.7 15.2	150.0 15.4	133.0 15.6	109.2 16.1	93.3 16.5	73.5 17.3	61.6 18.0	48.0 19.8	40.4 21.4	35.6 23.1	32.3 24.7		
15″	1035 15.2	525 15.4	355.0 15.7	270 15.9	219.0 16.1	185.0 16.2	160.7 16.5	142.5 16.8	117.0 17.2	100.0 17.6	78.7 18.5	66.0 19.4	51.4 21.2	43.3 22.9	38.2 24.7	34.6 26.5	32.0 28.3	30.0 30.0
16″	1104 16.2	560 16.5	378.7 16.7	288 16.9	233.6 17.2	197.3 17.4	171.4 17.6	152.0 17.9	124.8 18.4	106.7 18.8	84.0 19.8	70.4 20.7	54.9 22.6	46.2 24.5	40.7 26.4	36.9 28.2	34.1 30.1	32.0 32.0
18″	1242 18.3	630 18.5	426.0 18.8	324 19.1	262.8 19.3	222.0 19.6	192.9 19.9	171.0 20.1	140.4 20.6	120.0 21.2	94.5 22.2	79.2 23.3	61.7 25.4	52.0 27.5	45.8 29.6	41.5 31.8	38.4 33.9	36.0 36.0
20″	1380 20.3	700 20.6	473.3 20.9	360 21.2	292.0 21.5	246.7 21.8	214.3 22.1	190.0 22.4	156.0 22.9	133.3 23.5	105.0 24.7	88.0 25.9	68.6 28.2	57.8 30.6	50.9 32.9	46.2 35.3	42.7 37.6	40.0 40.0
22″	1518 22.3	770 22.6	520.7 23.0	396 23.3	321.2 23.6	271.3 23.9	235.7 24.3	209.0 24.8	171.6 25.2	146.7 25.9	115.5 27.2	96.8 28.5	75.4 31.1	63.6 33.6	56.0 36.2	50.8 38.9	46.9 41.4	44.0 44.0
24″	1656 24.4	840 24.7	568.0 25.1	432 25.4	350.4 25.8	296.0 26.1	257.1 26.5	228.0 26.8	187.2 27.5	160.0 28.2	126.0 29.6	105.6 31.1	82.3 33.9	69.3 36.7	61.1 39.5	55.4 42.4	51.2 45.2	48.0 48.0
26″	1794 26.4	910 26.8	615.3 27.1	468 27.5	379.6 27.9	320.6 28.3	278.6 28.7	247.0 29.0	202.8 29.8	173.3 30.6	136.5 32.1	114.4 33.6	89.1 36.7	75.1 39.8	66.2 42.8	60.0 45.9	55.5 48.9	52.0 52.0
28″	1932 28.4	980 28.8	662.7 29.2	504 29.6	408.8 30.1	345.3 30.5	300.0 30.9	266.0 31.3	218.4 32.1	186.7 32.9	147.0 34.6	123.2 36.2	96.0 39.5	80.9 42.8	71.3 46.1	64.6 49.4	59.7 52.7	56.0 56.0
30″	2070 30.4	1050 30.9	710.0 31.3	540 31.8	438.0 32.2	370.0 32.6	321.4 33.1	285.0 33.5	234.0 34.4	200.0 35.3	157.5 37.1	132.0 38.8	102.9 42.4	86.7 45.9	76.4 49.4	69.2 52.9	64.0 56.5	60.0 60.0
34″	2346 34.5	1190 35.0	804.7 35.5	612 36.0	511.0 36.5	419.3 37.0	364.3 37.5	323.0 38.0	265.2 39.0	226.7 40.0	178.5 42.0	149.6 44.0	116.6 48.0	98.2 52.0	86.5 56.0	78.5 60.0	72.5 64.0	68.0 68.0
38″	2622 38.6	1330 39.1	899.3 39.7	684 40.2	584.0 40.8	468.6 41.4	407.1 41.9	361.0 42.5	296.4 43.6	253.3 44.7	199.5 46.9	167.2 49.8	130.3 53.6	109.8 58.1	96.7 62.6	87.7 67.1	81.1 71.5	76.0 76.0
42″	2898 42.6	1470 43.2	994.0 43.9	756 44.4	657.0 45.1	518.0 45.7	450.0 46.3	399.0 46.9	327.6 48.2	280.0 49.4	220.5 51.9	184.8 54.3	144.0 59.3	121.3 64.2	106.9 69.2	96.9 74.1	89.6 79.1	84.0 84.0

The table gives, in inches, the distances from lens to object (greater conjugate focus—upper number) and from lens to ground glass (lesser conjugate focus—lower number) for different heights of images and different lengths of foci of lenses when the height of the object is 68 inches (= AVERAGE HEIGHT OF MAN).

EXAMPLES: To find the height of image of a person which is 114 inches distant from lens, when a lens of 12 inches focal length is employed.—The heigth of image is in this case 8 inches.

To find the distances between object, lens and ground-glass, if the image of a person is to be 8 inches high and a 12-inch focus lens is used.—The distance from object to lens will be 114 inches, and from lens to ground-glass 13.4 inches.

TABLE SHOWING DISPLACEMENT ON GROUND GLASS OF OBJECTS IN MOTION.

By HENRY L. TOLMAN.

[Republished, with corrections, from the *Photographic Times*.]

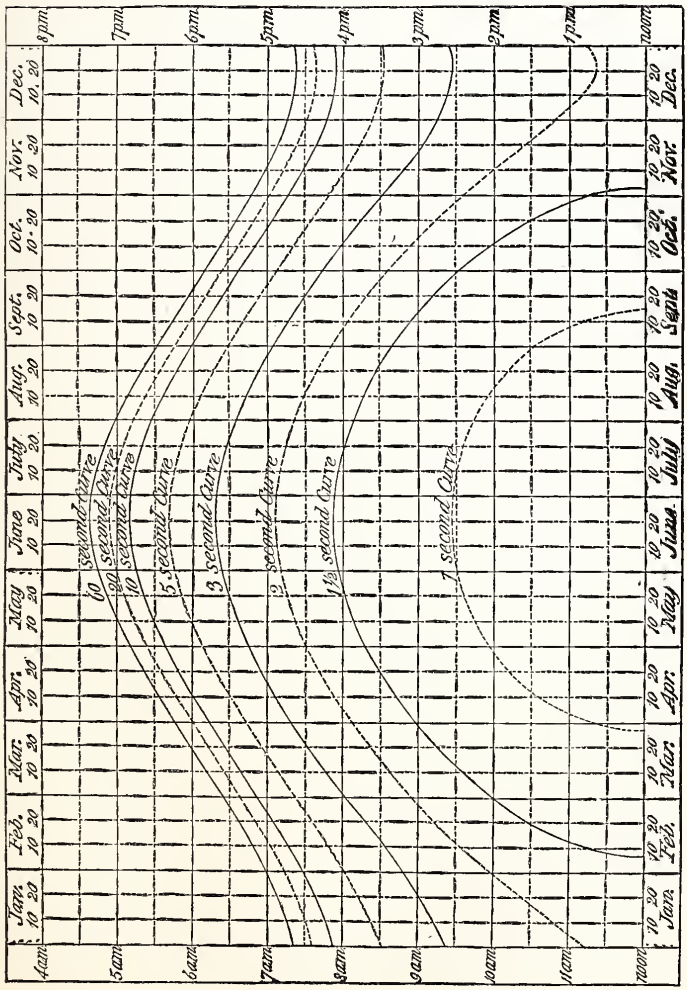
Lens 6 in Equiv. Focus, Ground Glass at Principal Focus of Lens.

Miles per Hour.	Feet per Second.	Distance on Ground Glass, in inches, with Object 30 Feet away.	Same with Object 60 Feet away.	Same with Object 120 Feet away.
1	1½	.29	.15	.073
2	3	.59	.29	.147
3	4½	.88	.44	.220
4	6	1.17	.59	.293
5	7½	1.47	.73	.367
6	9	1.76	.88	.440
7	10½	2.05	1·03	.513
8	12	2 35	1.17	.587
9	13	2.64	1.32	.660
10	14½	2.93	1.47	.733
11	16	3.23	1.61	.807
12	17½	3.52	1.76	.880
13	19	3.81	1.91	.953
14	20½	4.11	2.05	1.027
15	22	4.40	2.20	1.100
20	29	5.87	2.93	1.467
25	37	7.33	3.67	1.833
30	44	8.80	4.40	2.200
35	51	10.27	5.13	2.567
40	59	11.73	5.97	2·933
45	66	13.20	6.60	3.300
50	73	14.67	7.33	3.667
55	80	16.13	8.06	4.033
60	88	17.60	8.80	4.400
75	110	22.00	11.00	5.500
100	147	29.33	14.67	7.333
125	183	36.67	18.33	9.167
150	220	44.00	22.00	11.000

DIAGRAM OF COMPARATIVE EXPOSURES.

Computed for the latitude of Washington, D. C. (38 deg., 54 min., N.)

By Lieut. Commander S. W. Very, U. S. N.



The straight lines in this diagram represent divisions of time; the vertical ones showing the month and day, and the horizontal ones the time of day as shown by a sun-dial.

The curved lines are curves of equal altitudes of the sun, computed for the latitude of Washington, for the year 1889.

The combination of the two systems of lines is designed to enable the photographer, whether amateur or professional, who has at some time determined the length of exposure required under certain circumstances of subject, clouds, lens, diaphragm, plate or film, etc., to decide what exposure to give *under the same circumstances*, at any time between sunrise and sunset, on any day of the year.

The diagram is based upon one constructed for the latitude of London, published in the *Photographic News*, in 1887, and reprinted in the ANNUAL of 1888, and the same standard of comparison is used in this adaptation—that is, such circumstances of subject, clouds, lens, diaphragm, plate or film, etc., as will require an exposure of one second, at noon of any day between the 4th of April and the 7th of September, or at any time between a quarter to ten in the forenoon and a quarter past two in the afternoon on the 21st of June.

The diagram, although constructed for the year 1889, and for the latitude of Washington, will serve equally well for any other year, and well enough for ordinary purposes, throughout the United States (exclusive of Alaska), although in the extreme Northern and Southern belts it will not be accurate.

The diagram is strictly accurate for "apparent time" only, but it is sufficiently so for "local mean time" (which may differ sixteen minutes from "apparent time"), and in the great majority of places for "standard time" (which in some places differs half an hour from "mean time," and may differ three-quarters of an hour from "apparent time").

EXAMPLES.

Q. With a certain lens, diaphragm, etc., it is found that on the 20th of July, at 9.30 A.M., a certain subject requires three seconds' exposure; what time should be given on the 10th of December, at 3.30 P.M., the subject, lens, etc., being the same?

A. Fifteen seconds.

Q. At noon of the 15th of May, a certain subject required ten seconds; what length of exposure should be given to the same subject, with the same lens, diaphragm, etc., on the 1st of November, at 8 A M.?

A. Forty-five seconds.

TABLE OF COMPARATIVE LIGHT VALUES.

By Rev. Dwight W. Smith.

While there is a wider range in timing the exposure of a dry plate than is generally supposed, yet it is well known that there is but one correct interval for the best results with a normal developer. To best approximate that interval at all available hours of the day and year requires some attention and experience. There was a time when plates of a given brand and sensitiveness were quite unreliable, but now that they are so uniform, and improving more and more in this direction, tables of light values that were found to be comparatively useless will now be found of increasing value. The subjoined table, based upon the diagram in this book, by Lieutenant S. W. Very, U. S. N., has been computed for the first half of each month, and at a glance one may obtain information that would otherwise require time and trouble, and that even skill and experience does not always provide for, especially during the time indicated in which there is a rapid loss of light. It will be seen that in January, the light value for noon is given as 1.7, while at 4 P.M. the exposure would necessarily be more than five times that duration. For July, the most rapid as well as longest available light of any month, the light at noon is indicated by .2 instead of 1.7, and at 3 P.M. more than twice the time will be required.

The first column indicates the hour of the day; the second column the comparative light values in whole numbers and tenths.

JANUARY.		FEBRUARY.		MARCH.		APRIL.	
8	10	8	6	8	3	8	2
9	4	9	4	9	2	9	1.5
10	2.5	10	2	10	1.5	10	1.7
11	2	11	1.7	11	1.2	11	1
12	1.7	12	1.5	12	1	12	1
1	1.7	1	2	1	1	1	1
2	2.5	2	2.7	2	1.7	2	1.2
3	4.5	3	3.5	3	2	3	1.5
4	9	4	5	4	4	4	2
		5	60	5	20	5	4
						6	20
MAY.		JUNE.		JULY.		AUGUST.	
8	1.7	8	1.7	8	1.5	8	1.7
9	1.2	9	1.2	9	1.2	9	1.5
10	1	10	1	10	1	10	1
11	.7	11	.6	11	.5	11	.7
12	.5	12	.3	12	.2	12	.5
1	.7	1	.5	1	.5	1	.5
2	1	2	.7	2	1	2	1
3	1.2	3	1.2	3	1.2	3	1.2
4	1.5	4	1.5	4	1.5	4	1.7
5	2.7	5	2 2	5	2.2	5	2.5
6	15	6	5	6	4	6	5
7	80	7	20	7	15	7	60
SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
8	2	8	3	8	4	8	9
9	1.5	9	1.7	9	3	9	3
10	1	10	1.5	10	2	10	2
11	1	11	1.2	11	1 7	11	1.5
12	.5	12	1	12	1.5	12	1.7
1	1	1	1.2	1	1.5	1	2
2	1.2	2	1.5	2	2	2	2.5
3	1.5	3	2	3	2.5	3	3.5
4	2	4	2.7	4	5	4	8
5	3	5	6	5	20	5	80
6	10	6	40	6	70		

PROF. BURTON'S TABLE OF COMPARATIVE EXPOSURES.

Apertures Calculated on the Standard System of the Photographic Society.	Sea and Sky.	Open Landscape.	Landscape with heavy foliage in foreground.	Under Trees, up to		Fairly Lighted Interiors.		Badly Lighted Interiors, up to		Portraits in bright diffused Light out of doors.	Portraits in good Studio Light.		Portraits in Ordinary Room.	
				mins.	secs.	mins.	secs.	hrs.	mins.		mins.	secs.	mins.	secs.
No. 1, or $\frac{f}{4}$	$\frac{1}{160}$ sec.	$\frac{1}{50}$ sec.	$\frac{1}{8}$ sec.	0	10	0	10	0	2	$\frac{1}{6}$ sec.	0	1	0	4
No. 2, or $\frac{f}{5.657}$	$\frac{1}{80}$ sec.	$\frac{1}{25}$ sec.	$\frac{1}{4}$ sec.	0	20	0	20	0	4	$\frac{1}{3}$ sec.	0	2	0	8
No. 4, or $\frac{f}{8}$	$\frac{1}{40}$ sec.	$\frac{1}{12}$ sec.	$\frac{1}{2}$ sec.	0	40	0	40	0	8	$\frac{2}{3}$ sec.	0	4	0	16
No. 8, or $\frac{f}{11.314}$	$\frac{1}{20}$ sec.	$\frac{1}{6}$ sec.	1 sec.	1	20	1	20	0	16	$1\frac{1}{3}$ sec.	0	8	0	32
No. 16, or $\frac{f}{16}$	$\frac{1}{10}$ sec.	$\frac{1}{3}$ sec.	2 secs.	2	40	2	40	0	32	$2\frac{2}{3}$ secs.	0	16	1	4
No. 32, or $\frac{f}{22.627}$	$\frac{1}{5}$ sec.	$\frac{2}{3}$ sec.	4 secs.	5	20	5	20	1	4	$5\frac{1}{3}$ secs.	0	32	2	8
No. 64, or $\frac{f}{32}$	$\frac{2}{5}$ sec.	$1\frac{1}{3}$ sec.	8 secs.	10	40	10	40	2	8	$10\frac{2}{3}$ secs.	1	4	4	16
No. 128, or $\frac{f}{45.255}$	$\frac{4}{5}$ sec.	$2\frac{2}{3}$ secs.	16 secs.	21	20	21	20	4	16	21 secs.	2	8	8	32
No. 256, or $\frac{f}{64}$	$1\frac{3}{5}$ sec.	$5\frac{1}{3}$ secs.	32 secs.	42	40	42	40	8	32	42 secs.	4	16	17	4

LANTERNISTS' READY REFERENCE TABLE.

(From Optical Magic Lantern Journal.)

If A=focal length of objective, B=diameter of slide, C=diameter of disc on screen, D=distance between objective and screen, then $D=\frac{C \times A}{B}$ $A=\frac{D \times B}{C}$ $C=\frac{D \times B}{A}$

The following table has been computed by these rules and will show by a glance the relations between the size of disc and distance from screen for object glasses of all foci from 4 inches to 15 inches. The diameter of slide is taken as .3 inches, that being the usual opening of the mat.

Distance between Lantern and Screen.	FOCUS OF LENS. 4in.	5in.	6in.	7in.	8in.	9in.	10in.	11in.	12in.	13in.	14in.	15in.
	DIAMETER OF DISC.											
	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.
10 feet.	7 6	6 0	5 0	4 3	3 9	3 4	3 0	2 9	2 6	2 4	2 2	2 0
11 "	8 3	6 7	5 6	4 9	4 2	3 8	3 4	3 0	2 9	2 6	2 4	2 2
12 "	9 0	7 2	6 0	5 2	4 6	4 0	3 7	3 3	3 0	2 9	2 7	2 5
13 "	9 9	7 10	6 6	5 7	4 11	4 4	3 11	3 7	3 3	3 0	2 9	2 7
14 "	10 6	8 5	7 0	6 0	5 3	4 8	4 2	3 10	3 7	3 3	3 0	2 9
15 "	11 5	9 0	7 6	6 5	5 8	5 0	4 6	4 1	3 9	3 6	3 3	3 0
20 "	15 0	12 0	10 0	8 7	7 6	6 8	6 0	5 6	5 0	4 7	4 3	4 0
25 "	18 9	15 0	12 6	10 9	9 4	8 4	7 6	6 10	6 3	5 0	5 4	5 0
30 "	22 6	18 0	15 0	12 10	11 3	10 0	9 0	8 2	7 6	6 11	6 5	6 0
35 "	26 3	21 0	17 6	15 0	13 1	11 8	10 6	9 6	8 9	8 1	7 6	7 0
40 "	30 0	24 0	20 0	17 2	15 0	13 4	12 0	10 10	10 0	9 2	8 6	8 0
45 "	33 9	27 0	22 6	19 3	16 10	15 0	13 6	12 3	11 3	10 4	9 8	9 0
50 "	37 6	30 0	25 0	21 5	18 9	16 8	15 0	13 8	12 6	11 6	10 9	10 0

EXAMPLES.—An 8in. focus lens at a distance of 35ft. will give a disc of 13ft. 1in. To produce a disc of 12ft. with a lens of 10in. focus, the lantern and screen must be separated by 40ft. To produce a disc of 15ft. at a distance of 45ft. will require a lens of 9in. focus.

TABLE FOR ENLARGEMENT AND REDUCTION.

COMPUTED FOR CENTIMETERS OR INCHES.

Equivalent Focus of the Lens.	DISTANCES OF THE OBJECT AND THE GROUND GLASS SCREEN FROM THE CENTER OF THE OBJECTIVE.																								
	1 *t.*	2 *t.*	3 *t.*	4 *t.*	5 *t.*	6 *t.*	7 *t.*	8 *t.*	9 *t.*	10 *t.*	11 *t.*	12 *t.*	13 *t.*	14 *t.*	15 *t.*	16 *t.*	17 *t.*	18 *t.*	19 *t.*	20 *t.*	21 *t.*	22 *t.*	23 *t.*	24 *t.*	25 *t.*
5..	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130
	10	7.5	6.7	6.2	6	5.8	5.7	5.6	5.6	5.5	5.5	5.4	5.4	5.4	5.3	5.3	5.3	5.3	5.3	5.3	5.2	5.2	5.2	5.2	5.2
6..	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126	132	138	144	150	156
	12	9	8	7.5	7.2	7	6.9	6.8	6.7	6.6	6.5	6.5	6.5	6.4	6.4	6.4	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.2
7..	14	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	147	154	161	168	175	182
	14	10.5	9.3	8.8	8.4	8.2	8	7.9	7.8	7.7	7.6	7.6	7.5	7.5	7.5	7.4	7.4	7.4	7.4	7.4	7.3	7.3	7.3	7.3	7.3
8..	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144	152	160	168	176	184	192	200	208
	16	12	10.7	10	9.6	9.3	9.1	9	8.8	8.8	8.7	8.7	8.6	8.6	8.5	8.5	8.5	8.4	8.4	8.4	8.4	8.4	8.3	8.3	8.3
9..	18	27	36	45	54	63	72	81	90	99	108	117	126	135	144	153	162	171	180	189	198	207	216	225	234
	18	13.5	12	11.3	10.8	10.5	10.3	10.1	10	9.9	9.8	9.8	9.7	9.6	9.6	9.6	9.5	9.5	9.5	9.5	9.4	9.4	9.4	9.4	9.4
10..	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260
	20	15	13.3	12.5	12	11.7	11.4	11.3	11.1	11	10.9	10.8	10.8	10.7	10.7	10.6	10.6	10.6	10.5	10.5	10.5	10.5	10.4	10.4	10.4
11..	22	33	44	55	66	77	88	99	110	121	132	143	154	165	176	187	198	209	220	231	242	253	264	275	286
	22	16.5	14.7	13.8	13.2	12.8	12.6	12.4	12.2	12.1	12	11.9	11.8	11.8	11.7	11.7	11.6	11.6	11.6	11.6	11.5	11.5	11.5	11.5	11.4
12..	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228	240	252	264	276	288	300	312
	24	18	16	15	14.4	14	13.7	13.5	13.3	13.2	13.1	13	12.9	12.9	12.8	12.7	12.7	12.7	12.6	12.6	12.6	12.5	12.5	12.5	12.5
13..	26	39	52	65	78	91	104	117	130	143	156	169	182	195	208	221	234	247	260	273	286	299	312	325	338
	26	19.5	17.3	16.3	15.6	15.2	14.9	14.6	14.4	14.3	14.2	14.1	14	13.9	13.9	13.8	13.8	13.7	13.7	13.7	13.6	13.6	13.6	13.5	13.5
14..	28	42	56	70	84	98	112	126	140	154	168	182	196	210	224	238	252	266	280	294	308	322	336	350	364
	28	21	18.7	17.5	16.8	16.3	16	15.8	15.6	15.4	15.3	15.2	15.1	15	14.9	14.9	14.8	14.8	14.7	14.7	14.7	14.6	14.6	14.6	14.6
15..	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285	300	315	330	345	360	375	390
	30	22.5	20	18.8	18	17.5	17.1	16.9	16.7	16.5	16.4	16.3	16.2	16.1	16	15.9	15.9	15.8	15.8	15.8	15.7	15.7	15.7	15.6	15.6

16..	32	48	64	80	96	112	128	144	160	176	192	208	224	240	256	272	288	304	320	336	352	368	384	400	416
	32	24	21.3	20	19.2	18.7	18.3	18	17.8	17.6	17.5	17.3	17.2	17.1	17.1	17	16.9	16.9	16.8	16.8	16.8	16.7	16.7	16.7	16.6
17..	34	51	68	85	102	119	136	153	170	187	204	221	238	255	272	289	306	323	340	357	374	391	408	425	442
	34	25.5	22.7	21.3	20.4	19.8	19.4	19.1	18.9	18.7	18.5	18.4	18.3	18.2	18.1	18.1	18	17.9	17.9	17.9	17.8	17.8	17.7	17.7	17.7
18..	36	54	72	90	108	126	144	162	180	198	216	234	252	270	288	306	324	342	360	378	396	414	432	450	468
	36	27	24	22.5	21.6	21	20.6	20.3	20	19.8	19.6	19.5	19.4	19.3	19.2	19.1	19.1	19	18.9	18.9	18.9	18.8	18.8	18.8	18.7
19..	38	57	76	95	114	133	152	171	190	209	228	247	266	285	304	323	342	361	380	399	418	437	456	475	494
	38	28.5	25.3	23.8	22.8	22.2	21.7	21.4	21.1	20.9	20.7	20.6	20.5	20.4	20.3	20.2	20.1	20.1	20	20	19.9	19.9	19.8	19.8	19.8
20..	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400	420	440	460	480	500	520
	40	30	26.7	25	24	23.3	22.9	22.5	22.2	22	21.8	21.7	21.5	21.4	21.3	21.3	21.2	21.1	21.1	21	21	20.9	20.9	20.8	20.8
21..	42	63	84	105	126	147	168	189	210	231	252	273	294	315	336	357	378	399	420	441	462	483	504	525	546
	42	31.5	28	26.3	25.2	24.5	24	23.6	23.3	23.1	22.9	22.8	22.6	22.5	22.4	22.3	22.2	22.2	22.1	23.1	22	22	21.9	21.9	21.8
22..	44	66	88	110	132	154	176	198	220	242	264	286	308	330	352	374	396	418	440	462	484	506	528	550	572
	44	33	29.3	27.5	26.4	25.7	25.1	24.8	24.4	24.2	24	23.8	23.7	23.6	23.5	23.4	23.3	23.2	23.2	23.1	23	23	23	22.9	22.9
23..	46	69	92	115	138	161	184	207	230	253	276	299	322	345	368	391	414	437	460	483	506	529	552	575	598
	46	34.5	30.7	28.8	27.6	26.8	26.3	25.9	25.6	25.3	25.1	24.9	24.8	24.6	24.5	24.4	24 4	24.3	24.2	24.2	24.1	24	24	24	23.9
24..	48	72	96	120	144	168	192	216	240	264	288	312	336	360	384	408	432	456	480	504	528	552	576	600	624
	48	36	32	30	28.8	28	27.4	27	26.7	26.4	26.2	26	25.8	25.7	25.6	25.5	25.4	25.3	25.3	25.2	25.1	25.1	25	25	25
25..	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650
	50	37.5	33.3	31.3	30	29.2	28.6	28.1	27.8	27.5	27.3	27.1	26.9	26.8	26.7	26.6	26.5	26.4	26.3	26.3	26.2	26.1	26.1	26	26

The use of the above table will best be explained by illustrations:

To enlarge six times with a lens of 15 centimeters (or inches) focal length. We find in the table under 6 *t.* and opposite 15, the figures $\frac{105}{17.5}$, hence the object must be 17.5, and the screen 105 centimeters (or inches) from the centre of the lens.

To reduce eight times with a lens of 19 centimeters (or inches) focus, the object must be 171 and the screen 21.4 centimeters (or inches) from centre of lens.

The table can be formulated thus: Where p = focal length of lens, a = distance from ground-glass to centre of lens and b = distance from object to centre of lens, then $\frac{1}{a} + \frac{1}{b} = \frac{1}{p}$

USUAL SIZES OF FRENCH, GERMAN AND ITALIAN DRY PLATES.

French and German.	*Inches.*
6½x 9 Centimetres	2.5x 3.6
9 x12 "	3.6x 4.7
12 x15 "	4.7x 5.9
13 x18 "	5.1x 7.0
12 x20 "	4.7x 7.8
15 x21 "	5.9x 8.2
15 x22 "	5.9x 8.6
18 x24 "	7.2x 9.4
21 x27 "	8.2x10.6
24 x30 "	9.4x11.8
27 x33 "	10.6x12.9
27 x35 "	10.6x13.7
30 x40 "	11.8x15.7
40 x50 "	15.7x19.6
50 x60 "	19.6x23.6

Italian.	*Inches.*
9x12 Centimetres	3.6x 4.7
12x16 "	4.7x 6.3
12x18 "	4.7x 7.2
13x18 "	5.1x 7.0
12x20 "	4.7x 7.8
18x24 "	7.0x 9.4
21x27 "	8.2x10 6
24x30 "	9.4x11.8
27x33 "	10.6x12.9
30x36 "	11.8x14.1
40x50 "	15.7x19.6
50x60 "	19.6x23.6

SIZES OF GLASS, MOUNTS, PAPER, ETC.

Petite cards	1⅝x3⅛
One-ninth plate	2 x2½
One-sixth plate	2¾x3¼
One-fourth plate	3¼x4¼
Half plate	4¼x5½ and
Half plate (English)	4¾x6½
Whole plate (4–4)	6½x8½
Extra 4–4	8 x10

Other sizes are expressed by inches.

Sizes of Mounts.

Stereoscopic	3½x7, 4x7, 4¼x7, 4½x7, 5x8		
Victoria	3¼x5	Minette	1⅝x2⅜
Imperial	7⅞x9⅞	Card	2½x4⅛
Boudoir	5¼x8½	Cabinet	4¼x6½
Panel	4 x8¼	Promenade	4⅛x7⅛

Sizes of Albumen Paper.

18x23¾, 20½x24½, 22x36, 26x40, 27x42.

Size of blotting paper 19x24

FREEZING MIXTURES.

Parts.	Reducing the Temperature From Degrees of the Celsius	To Thermometer.
3 Nitrate of sodium + 4 Water	+13.2 deg.	— 5.3 deg.
9 Phosphate of sodium + 4 dilute Nitric acid	+10 "	— 9 "
3 Sulphate of sodium + 2 dilute Nitric acid	+10 "	—10 "
1 Nitrate of sodium + 4 Water		—10.6 "
1 Chloride of potassium + 4 Water		—11.8 "
5 Sal ammoniac + 5 Saltpetre + 16 Water	+10 deg.	—12 "
1 Nitrate of ammonia + 1 Water	+10 "	—15.5 "
8 Sulphate of sodium + 5 conc. Sulphuric acid	+10 "	—17 "
1 Sulphocyanate of Potass. + 1 Water	+18 "	—21 "
1 Chloride of sodium + 3 Snow		—21 "
1 Sal ammoniac + 1 Saltpetre + 1 Water	+ 8 deg.	—24 "
3 Crystal. chloride of calcium + 1 Snow		—36 "
1 Snow + 1 dilute Sulphuric acid	— 5 deg.	—41

LIST OF THE PRINCIPAL CHEMICALS USED IN PHOTOGRAPHY, WITH ENGLISH, LATIN, GERMAN AND FRENCH NAMES.

COMPILED BY C. L. LOCHMAN.

ENGLISH.	LATIN.	GERMAN.	FRENCH.
Acid, Acetic	Acidum aceticum	Essigsäure	Acide acetique.
" " Glacial	Acidum aceticum glaciale.	Eisessig	Vinaigre glacial.
" Boric· Boracic	Acidum boricum	Borsäure	Acide borique.
" Chromic	Acidum chromicum	Chromsäure	Acide chromique.
" Citric	Acidum citricum	Citronensäure	Acide citrique.
" Gallic	Acidum gallicum.	Gallussäure	Acide gallique.
" Hydrochloric *Muriatic.*	Acidum hydrochloricum.	Salzsäure	Acide chlorhydrique.
" Hydrofluoric	Acidum hydrofluoricum.	Fluss-säure	Acide fluorhydrique.
" Nitric	Acidum nitricum	Salpetersäure	Acide nitrique (azotique.
" Oxalic	Acidum oxalicum	Oxalsäure	Acide oxalique.
" Pyrogallic; Pyrogallol	Acidum pyrogallicum.	Pyrogallussäure; Pyrogallol.	Acide pyrogallique.
" Tartaric	Acidum tartaricum	Weinsteinsäure	Acide tartarique.
" Sulphuric	Acidum sulphuricum	Schwefelsäure	Acide sulfurique.
" Tannic; Tannin	Acidum tannicum	Gerbsäure	Acide tannique.
Alcohol, Ethyl	Alcohol	Weingeist	Alcool.
Alcohol, Wood	Alcohol methylicum	Holzgeist	Alcool methylique.
Alum, Ammonia	Aluminii et ammonii sulphas.	Ammoniak-Alaun	Sulphate d' alumine et d'ammoniaque.
Alum, Chrome	Chromii et potassii sulphas.	Chrom-Alaun	Alun chromi-potassique.
Alum, Potassa	Aluminii et potassii sulphas.	Kali-Alaun	Sulfate d'alumine et de potasse.
Amidol (*Diamidophenol Chlorhydrate.*)	Amidolum	Amidol	Amidol.
Ammonium Bichromate	Ammonii bichromicum	Doppeltchromsaures Ammon.	Bichromate d'ammoniaque.
" Bromide	Ammonii bromidum	Ammoniumbromid	Bromure d'ammonium.
" Carbonate	Ammonii carbonas	Ammoniumcarbonat	Carbonate d'ammoniaque.
" Chloride	Ammonii chloridum	Ammoniumchlorid	Chlorure d'ammonium
" Citrate	Ammonii citras	Ammoniumcitrat	Citrate d'ammoniaque.
" Iodide	Ammonii iodidum	Ammoniumiodid	Iodure d'ammonium.
" Nitrate	Ammonii nitras	Ammoniumnitrat	Azotate d'ammoniaque
" Salicylate	Ammonil salicylas	Ammoniumsalicylat	Salicylate d'ammoniaque.
" Succinate	Ammonii succinas	Ammoniumsuccinat	Succinate d'ammoniaque.
" Sulphocyanate	Ammoniisulphocyanas	Ammoniumsulfocyanat.	Sulfcyanate d'ammoniaque.
" Sulphydrate	Liquor ammonii hydrosulphas.	Schwefelammonium-lösung; Ammonium-sulfhydrat.	Sulfhydrate d'ammoniaque.
" *Sulphide Solution*			
Barium Bromide	Barii bromidum	Baryumbromid	Bromure de baryum.
" Chloride	Barii chloridum	Baryumchlorid	Chlorure de baryum.
" Iodide	Barii iodidum	Baryumiodid	Iodure de baryum.
" Nitrate	Barii nitras	Baryumnitrat	Nitrate de baryte
Benzin	Benzinum	Petroleumbenzin	Benzine.
Benzol	Benzolum	Benzol	Benzole.
Bromine	Bromum; Brominium.	Brom	Brome.
Cadmium (metal)	Cadmium	Cadmium; Kadmium.	Cadmium.
" Bromide	Cadmii bromidum	Kadmiumbromid; Bromkadmium.	Bromure de cadmium.
" Chloride	Cadmii chloridum	Cadmiumchlorid	Chlorure de cadmium.
" Iodide	Cadmii iodidum	Kadmiumjodid; Jodkadmium.	Iodure de cadmium.
" Nitrate	Cadmii nitras	Cadmiumnitrat	Nitrate de cadmium.
Calcium Bromide	Calcii bromidum	Bromcalcium	Bromure de calcium.
" Carbonate	Calcii carbonas	Calciumcarbonat	Carbonate de chaux.
" Iodide	Calcii iodidum	Jodcalcium	Iodure de calcium.
Chloroform	Chloroformum	Chloroform	Chloroforme.

LIST OF THE PRINCIPAL CHEMICALS, ETC.—*Continued.*

ENGLISH.	LATIN.	GERMAN.	FRENCH.
Collodion	Collodium	Collodion	Collodion.
Cobalt Chloride	Cobalti chloridum	Cobaltchlorid	Chlorure de cobalt.
Copper, metal	Cuprum	Kupfer	Cuivre.
" Bromide	Cupri bromidum	Kupferbromid	Bromure de cuivre.
" Chloride	Cupri chloridum	Kupferchlorid	Chlorure de cuivre
" Nitrate	Cupri nitras	Kupfernitrat	Nitrate de cuivre.
" Sulphate	Cupri sulphas	Kupfersulfat	Sulfate de cuivre.
Dextrin	Dextrinum	Stärkegummi	Dextrine.
Eikonogen	Eikonogenum	Eikonogen	Eikonogen.
Ether (Sulphuric)	Aether (sulphuricus)	Aether; Schwefeläther	Ether sulfurique.
Gelatin	Gelatina	Gelatin	Gelatine.
Glycerin	Glycerinum	Glycerin	Glycerine.
Glycin	Glycinum	Glycin	Glycine.
Gold	Aurum	Gold	Or.
" Terchloride,	Auri chloridum	Goldchlorid	Chlorure d'or.
" and Sodium Chloride.	Auri et sodii chloridum	Natriumgoldchlorid	Chlorure d'or et de Sodium.
Gum Arabie	Gummi Arabicum	Arabisches Gummi	Gomme Arabique.
Gum Sandarac	Sandarac	Sandarak	Sandaraque.
Gum Shellac	Ressina lacca	Lack Gummilack	Laque.
Hydrochinon; Hydroquinon.	Hydroehinonum	Hydrochinon	Hydrochinon.
Iodine	Iodum: Iodidium	Jod	Iode.
Iron (Metal)	Ferrum	Eisen	Fer.
" Ammonio-Sulphate. (*Ammonio-Ferric Sulphate.*)	Ferri et ammonii sulphas.	Ferro-ammonium sulphat. *Schwefelsaure Eisenoxydul-ammoniak.*	Sulfate d'ammoniaque et de fer.
" Chloride (Ferrous) (*Ferro Chloride*).	Ferro chloridum	Eisenchlorür (*Ferrochlorid*).	Chlorure de fer. (*Chlorure ferreux*).
" Chloride (Ferric). (*Ferric Chloride*).	Ferri chloridum. (*Ferri-sesquichloridum*).	Eisenchlorid (*Ferrichlorid*).	Perchlorure de fer.
" Iodide	Ferri iodidum	Eiseniodid (Jodeisen; Ferroiodid)	Iodure de fer.
" Oxalate (Ferrous)	Ferro-oxalas	Eisenoxalat	Oxalate de fer.
" Sulphate	Ferri sulphas	Ferrosulfat	Sulfate de fer.
Lead (Metal)	Plumbum	Blei	Plomb.
" Acetate	Plumbi acetas	Bleiacetat	Acetate de plomb.
" Chloride	Plumbi chloridum	Bleichlorid	Chlorure de plomb.
" Nitrate	Plumbi nitras	Bleinitrat	Nitrate de plomb.
Lithium Bromide	Lithii bromidum	Bromlithium	Bromure de lithium.
" Iodide	Lithii iodidum	Jodlithium	Iodure de lithium.
Magnesium Bromide	Magnesii bromidum	Brommagnesium	Bromure de magnesium
" Iodide	Magnesii iodidum	Jodmagnesium	Iodure de magnesium.
" Sulphate	Magnesii sulphas	Magnesiumsulfat	Sulfate de magnesie.
Mercury Bichloride	Hydrargyri bichloridum.	Aetzendes Quecksilber chlorid.	Deutochlorure de mercure.
Metol (*Monomethyl-paramido-meta-cresolate.*)	Metolum	Metol	Metole.
Oil of Lavender	Oleum Lavandulæ	Lavendelöl	Essence de Lavand.
Oil of Turpentine	Oleum Terebinthinæ	Terpintinöl	Essence Terebinthine.
Para-amidophenol Hydrochlorate.	Para-amidolphenol-hydrochloras.	Paramidophenol-hydrochlorat.	Para-amidophenol-hydrochlorate.
Platinum Chloride	Platini chloridum	Platinchlorid	Perchlorure de platine.
Plaltino Potassium Chloride.	Platini et Potassii chloridum.	Kali-Platinumchlorid	Chlorure de platinum et de potassium.
Potassa, Sulphnrated; Lilver of Sulphur.	Potassa sulphurata	Schwefelleber	Sulfure de potasse.
Potassium Acetate	Potassii acetas	Kaliumacetate	Acetate de potasse.
" Bichromate	Potassii bichromas	Kaliumbichromat	Bichromate de potasse.
" Bromide	Potassii bromidum	Kaliumbromid	Bromure de potassium.
" Carbonate	Potassii carbonas	Kaliumcarbonat	Carbonate de potasse.
" Citrate	Potassii citras	Kaliumcitrat	Citrate de potasse.
" Chloride	Potassii chloridum	Kaliumchlorid	Chlorure de potassium.
" Cyanide	Potassii cyanidum	Cyankalium	Cyanure de potassium.
" Ferricyanide	Potassii ferricyanidum	Ferridcyankalium	Ferricyanure de potassium.
" Ferrocyanide	Potassii ferrocyanidum	Ferrocyanklium	Ferrocyanure de potassium.
" Hydrate; Potassa.	Potassii hydras; Potassa.	Aetzkali	Potasse caustique.

LIST OF THE PRINCIPAL CHEMICALS, ETC.—*Continued.*

ENGLISH.	LATIN.	GERMAN.	FRENCH.
Potassium Iodide	Potassii iodidum	Jodkalium	Iodure de potassium.
" Metabisulphite	Potassii metabisulphis.	Kalium-metabisufis	Metabisulfis de potassium.
" Nitrate	Potassii nitras	Kaliumnitrat	Nitrate de potasse.
" Oxalate, neutral.	Potassii oxalas	Kalium Oxalat, neutrales.	Oxalate de potasse.
" Permanganate	Potassii permanganas.	Kaliumpermanganate.	Permanganate de potasse.
" Sulphite	Potassii sulphis.	Kaliumsulfit.	Sulfite de potassium.
" Sulphocyanide	Potassii sulphocyanidum.	Kalium sulfocyanat; Rhodankalium.	Sulfocyanure de potassium.
Pyroxylin; Gun Cotton.	Pyroxylinum	Collodionwolle; Schiess-baumwolle.	Pyroxyle; Fuimi-coton
Reducin	Reducinum	Reducin	Reducine.
Rodinal	Rodinalum	Rodinal	Rodinale.
Silver	Argentum	Silber	Argent.
" Acetate	Argenti acetas	Silberacetat	Acetate d'argent.
" Citrate	Argenti citras	Silbercitrate	Citrate d'argent.
" Chloride	Argenti chloridum	Silberchlorid	Chlorure d'argent.
" Iodide	Argenti iodidum	Silberiodid	Iodure d'argent.
" Nitrate	Argenti nitras	Silbernitrat	Nitrate d'argent.
" Oxide	Argenti oxidum	Silbor Oxyd	Oxyde d'argent.
" Sulphate	Argenti sulphas	Silbersulfat	Sulfate d'argent.
Sodium Acetate	Sodii acetas	Natriumacetate	Acetate de soude.
" Biborate; Borax.	Sodii biboras	Natriumborat; Borax.	Borate de soude.
" Bicarbonate	Sodii bicarbonas	Natriumbicarbonat	Bicarbonate de soude.
" Bromide	Sodii bromidum	Bromnatrium	Bromure de sodium.
" Carbonate	Sodii carbonas	Natriumcarbonat	Carbonate de soude.
" Chloride	Sodii chloridum	Chlornatrium	Chlorure de sodium.
" Citrate	Sodii citras	Natriumcitrat; Citronensaures Natron.	Citrate de soude.
" Hydrate; Soda	Sodii hydras; Soda	Aeznatron	Soude caustique.
" Hyposulphite or Thiosulphate.	Sodii hyposulphis	Unterschwefligsaures Natron.	Hyposulfite de soude.
" Iodide	Sodii iodidum	Jodnatrium	Iodure de sodium.
" Sulphate	Sodii sulphas	Natriumsulfat	Sulfate de soude.
" Sulphite	Sodii sulphis	Natrium sulfit	Sulfite de soude.
" Tungstate	Sodii tungstas	Wolfraumsaures Natron.	Tungstate de soude.
Starch	Amylum	Stärke; Stârkmehl	Amidon.
Strontium Bromide	Strontii bromidum	Bromstrontium	Bromure de strontium.
" Chloride	Strontii chlordum	Chlorstrontium	Chlorure de strontium.
" Iodide	Strontii iodidum	Jodstrontium	Iodure de strontium.
Tannin, see Tannic Acid.			
Turpentine, Crude or White.	Terebinthina communis.	Geweiner Terpentin	Terebenthine commune.
Uranium Bromide	Uranii bromidum	Bromuranium	Bromure d'uranium.
Uranium Nitrate	Uranii nitras	Salpetersaures Uranoxyd.	Nitrate d'urane.
Water, Distilled	Aqua destillata	Destillirtes Wasser	Eau distillée.
Water of Ammonia	Aqua ammoniæ	Salmiakgeist; Ammoniak-Flussigkeit.	Eau d'ammoniaque.
Zinc Bromide	Zinci bromidum	Zinkbromid; Bromzink.	Bromure de zinc.
Zinc Chloride	Zinci chloridum	Chlorzink	Chlorure de zinc.
Zinc Iodide	Zinci iodidum	Zinkjodid; Jodzink	Iodure de zinc.

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AMERICAN.

ANN ARBOR UNIVERSITY, MICHIGAN. *Director*, Prof. A. B. Stevens. Theory and Practice· Special Instructions in Photo-micrography; Lectures on Photo-mechanical Processes. It is obligatory for the students to have passed two courses in Chemistry. Examination and Diplomas.

CORNELL UNIVERSITY, ITHACA, N. Y. *Instructors*, Assistant Professor Moler and Messrs. Hotchkiss and Child. One lecture a week with laboratory practice, during the spring term.

MAINE STATE COLLEGE, ORONO, MAINE. *Instructor*, Assist. Prof. D. W. Colby.

EUROPEAN.

PHOTOGRAPHICAL LABORATORY OF THE POLYTECHNICUM IN CHARLOTTENBURG, BERLIN. Prof. Schlichting, *Director*. Prof. Dr. H. W. Vogel, *Instructor*. Chemistry, Physics, Drawing, Practical Exercises and Photo-mechanical Printing Methods.

BRAUNSCHWEIG DEPARTMENT OF POLYTECHNICAL SCHOOL. Prof. Dr. C. Koppe and Dr. Max Muller. Theory and Practice; Photo-micrography; Photo-grammetry.

KARLSRUHE. Prof. Dr. Schuberg. Theory and Practice in Studio and Field; Lectures.

MUNICH. Dr. M. Th. Edmann. Photography applied to the Mechanical Arts.

SCHLOSS GRÖNENBACH, BAVARIA. W. Cronenberg. Mechanical Printing Methods; Wet and Dry Processes.

VIENNA IMPERIAL POLYTECHNICUM. Prof. Dr. Joseph M. Eder. Elements of Photography and Photo-chemistry; Reproduction Methods.

VIENNA IMPERIAL INSTITUTE FOR PHOTOGRAPHIC PRACTICE, REPRODUCTION METHODS, AND MECHANICAL PRINTING. Prof. Dr. Joseph M. Eder, *Director*. Profs. Hans Lenhardt, Alex. Lainer, I. Hörwarter, C. Jasper, *Instructors*. Two Courses of Instruction. Drawing; Chemistry; Optics; Theories of Photographic Processes; Retouching Positives.

UNITED STATES PATENTS.

Suits for redress on account of infringement of patents are brought in the United States Circuit Court for the District where the defendant resides. Redress may be had through an injunction preventing further infringement and an accounting of the damages caused the patentee, or the profits, gains, or advantages made by the infringer.

Until recently appeals from decisions rendered by the United States Circuit Court were necessarily taken to the Supreme Court of the United States, and, owing to the great amount of business done by the latter, a delay of at least four years was suffered by an appellee.

A new special Court, designated the Circuit Court of Appeals has been provided. Appeals may hereafter be taken to this Court, and are likely to be reached and disposed of quite expeditiously. This is of particular advantage to patentees, in view of the fact that their monopolies run but a limited time.

Patents are issued in the name of the United States and under the seal of the Patent Office to any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement thereof, not known or used by others in this country, and not patented or described in any printed publication in this or any foreign country, before his invention or discovery thereof, and not in public use or on sale for more than two years prior to his application, unless the same is proved to have been abandoned; and by any person who, by his own industry, genius, efforts, and expense, has invented and produced any new and original design for a manufacture, bust, statue, alto-relievo, or bas-relief; any new and original design for the printing of woolen, silk, cotton, or other fabrics, any new and original impression, ornament, pattern, print, or picture to be printed, painted, cast, or otherwise placed on or worked into any article of manufacture; or any new, useful, and original shape or configuration of any article of manufacture, the same not having been known or used by others before his invention or production thereof, nor patented, nor described in any printed publication, upon payment of the fees required by law, and other due proceedings had.

Joint inventors are entitled to a joint patent; neither can claim one separately. Independent inventors of distinct and independent improvements in the same machine can not obtain a joint patent for their separate inventions; nor does the fact that one furnishes the capital and another makes the invention entitle them to make application as joint inventors; but upon the execution and recording of a proper assignment by the true inventor, the patent will be issued in the joint names of the parties.

Every patent contains a grant to the patentee, his heirs or assigns, for the term of seventeen years, of the exclusive right to make, use, and vend the invention or discovery throughout the United States and Territories, referring to the specification for the particulars thereof.

If it appear that the inventor, at the time of making his application, believed himself to be the first inventor or discoverer, a patent will not be refused, nor shall any patent be declared invalid on account of the invention or discovery, or any part thereof, having been known or used in any foreign country before his invention or discovery thereof, unless the application for said foreign patent was filed more than seven months prior to the filing of the application in this country, in which case no patent will be granted in this country.

Letters Patent granted under a foreign government will not, while in force, prevent the inventor from obtaining a patent in the United States, unless the invention shall have been introduced into public use

into the United States more than two years prior to the filing of said application. But every patent granted for an invention which is the subject of Letters Patent still in force and previously granted to the same inventor in a foreign country will be so limited as to expire at the same time with such foreign patent, or, if there be more than one, at the same time with the one having the shortest unexpired term, but in no case will it be in force more than seventeen years.

Applications.

Application for a patent must be made in writing to the Commissioner of Patents. The applicant must also file in the Patent Office a written description of the invention, and of the manner and process of making, constructing, compounding, and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct, compound, and use the same; and in case of a machine, he must explain the principle thereof, and the best mode in which he has contemplated applying that principle, so as to distinguish it from other inventions, and particularly point out and distinctly claim the part, improvement, or combination which he claims as his invention or discovery. The specification and claim must be signed by the inventor and attested by two witnesses.

The applicant shall also make oath that he verily believes himself to be the original, sole, and first inventor or discoverer of the art, machine, manufacture, composition, or improvement, for which he solicits a patent; that he does not know and does not believe the same was ever before known or used, or patented or described in any printed publication before his invention or discovery thereof, or more than two years prior to his application; that it has not been in public use or on sale for more than two years prior to his application; that no application for a patent on said improvement has been filed by him or his representative or assigns in any country; or else he must state when and where such applications have been filed; that said invention has not been patented to him nor to others in any country, or else specify fully when and where such patents have been granted; and shall state of what country he is a citizen. Such oath may be made before any person within the United States authorized by law to administer oaths, or, when the applicant resides in a foreign country, before any minister, charge d'affairs, consul, or commercial agent holding commission under the Government of the United States, or before any notary public of the foreign country in which the applicant may be.

When the nature of the case admits of drawings, the applicant must furnish one copy signed by the inventor or his attorney in fact, and attested by two witnesses, to be filed in the Patent Office. In all cases which admit of representation by model, the applicant, if required by the Commissioner, shall furnish a model of convenient size to exhibit advantageously the several parts of his invention or discovery. Or, if the invention or discovery is a composition of matter, the applicant may be required to furnish specimens of ingredients and of the composition, sufficient in quantity for the purpose of experiment.

On the filing of such application and the payment of the fee required by law, the same will be duly examined and if, after such examination, it appears that the claimant is justly entitled to a patent under the law, and that the same is sufficiently useful and important, the Commissioner will issue a patent therefor.

All applications for patents shall be completed and prepared for examination within one year after the filing of the application, and in default thereof, or upon failure of the applicant to prosecute the same within one year after any action therein, of which notice shall have

been given to the applicant, they shall be regarded as abandoned by the parties thereto, unless it be shown to the satisfaction of the Commissioner of Patents that such delay was unavoidable.

Assignments.

Every patent or any interest therein shall be assignable in law by an instrument in writing; and the patentee, or his assigns or legal representatives may, in like manner, grant and convey an exclusive right under his patent to the whole or any specified part of the United States. Such an assignment, grant, or conveyance, shall be void as against any subsequent purchaser or mortgagee for a valuable consideration, without notice, unless it is recorded in the Patent Office within three months from the date thereof. No instrument will be recorded *which is not in the English language* and which does not, in the judgment of the Commissioner, amount to an assignment, grant, mortgage, lien, incumbrance, or license, or which does not affect the title of the patent or invention to which it relates.

If any such assignment, grant, or conveyance of any patent shall be acknowledged before any Notary Public of the several States or Territories, or the District of Columbia, or any Commissioner of the United States Circuit Court, or before any Secretary of Legation or Consular Officer authorized to administer oaths or perform notarial acts under Section 1750, Revised Statutes, the certificate of such acknowledgment, under the hand and official seal of such notary or other officer, shall be prima facie evidence of the execution of such assignment, grant or conveyance.

Reissures.

A reissue is granted to the original patentee, his legal representatives, or the assignees of the entire interest when, by reason of a defective or insufficient specification, or by reason of the patentee claiming as his invention or discovery more than he had a right to claim as new, the original patent is inoperative or invalid, provided the error has arisen from inadvertence, accident, or mistake, and without any fraudulent or deceptive intention. The applications must be made and the specification sworn to by the inventors, if they be living.

Caveats.

A caveat under the patent law is a notice given to the Patent Office of the caveator's claim as inventor, in order to prevent the grant of a patent to another for the same alleged invention upon an application field during the life of the caveat without notice to the caveator.

Any citizen of the United States who has made a new invention or discovery, and desires further time to mature the same, may, on payment of a fee of $10, file in the Patent Office a caveat setting forth the object and the distinguishing characteristics of the invention, and praying protection of his right until he shall have matured his invention. Such caveat shall be filed in the confidential archives of the Office and preserved in secrecy, and shall be operative for the term of one year from the filing thereof. If, during the life of the caveat, another inventor files an application for patent for substantially the same invention, the caveator will be notified to that effect, and given a certain time in which to file an application for patent for his own invention. Should the two applications then interfere, each party will be given an opportunity to prove priority of invention, and the patent will be granted to that party whom the Patent Office, after considering all the proofs, considers to be the original and first inventor.

An alien has the same privilege, if he has resided in the United

States one year next preceding the filing of his caveat, and has made oath of his intention to become a citizen.

The caveat must comprise a specification, oath, and, when the nature of the case admits of it, a drawing, and, like the application, must be limited to a single invention or improvement.

Fees.

Fees must be paid in advance, and are as follows: On filing each original application for a patent, $15. On issuing each original patent, $20. In design cases: For three years and six months, $10; for seven years, $15; for fourteen years, $30. On filing each caveat, $10. On every application for the reissue of a patent, $30. On filing each disclaimer, $10. For certified copies of patents and other papers, including certified printed copies, ten cents per hundred words. For recording every assignment, agreement, power of attorney, or other paper, of three hundred words or under, $1; of over three hundred and under one thousand words, $2; of over one thousand words, $3. For copies of drawings, the reasonable cost of making them.

COPYRIGHT LAW OF THE UNITED STATES.

1. A *printed* copy of the title of the book, map, chart, dramatic or musical composition, engraving, cut, print, photograph, or chromo, or a *description* of the painting, drawing, statue, statuary, or model or design for a work of the fine arts, for which copyright is desired, must be delivered to the Librarian of Congress or deposited in the mail, within the United States, *prepaid*, addressed

LIBRARIAN OF CONGRESS, Washington, D. C.

This must be done on or before day of publication in this or any foreign country.

The *printed title* required may be a copy of the title page of such publications as have title pages. *In other cases the title must be printed expressly for copyright entry*, with name of claimant of copyright. The style of type is immaterial, and the print of a typewriter will be accepted. But a separate title is required for each entry, and *each* title must be printed on paper as large as commercial note. The title of a *periodical* must include the date and number; and each number of the periodical requires a separate entry of copyright.

2. The legal fee for *recording* each copyright claim is 50 cents, and for a *copy* of this record (or certificate of copyright under seal of the office) an additional fee of 50 cents is required, making $1, if certificate is wanted, which will be mailed as soon as reached in the records. Publications which are the production of persons not citizens or residents of the United States, the fee for recording title is $1, and 50 cents additional for a copy of the record. Certificates covering more than one entry in one certificate are not issued.

3. Not later than the day of publication in this country or abroad, two complete copies of the best edition of each book or other article must be delivered, or deposited in the mails within the United States addressed

LIBRARIAN OF CONGRESS, Washington, D. C.

to perfect the copyright.

The freight or postage must be prepaid, or the publications inclosed in parcels covered by printed Penalty Labels, furnished by the Librarian, in which case they will come FREE by mail (*not express*), without limit of weight, according to rulings of the Post Office Department. Books must be printed from *type set or plates made in the United*

States; photographs from *negatives made in the United States;* chromos and lithographs from *drawings on stone or transfers therefrom made in the United States.*

The deposit of copies above specified is an imperative requirement and copyright is incomplete and void and of no force or effect unless the same has been complied with. A penalty of $25 is also incurred. No copy is required to be deposited elsewhere.

The law requires one copy of each new edition, wherein any substantial changes are made, to be deposited with the Librarian of Congress.

4. No copyright is valid unless notice is given by inserting in every copy published, on the title page or the page following, if it be a book; or if a map, chart, musical composition, print, cut, engraving, photograph, painting, drawing, chromo, statue, statuary, or model or design intended to be perfected as a work of the fine arts, by inscribing upon some portion thereof, or on the substance on which the same is mounted, the following words, viz.: "*Entered according to act of Congress, in the year*——, *by*———, *in the office of the Librarian of Congress, at Washington*," or at the option of the person entering the copyright, the words: "*Copyright 18*—, *by*———." This notice *must* be in either of the two forms above given which are in the exact language of the statute, and failure to observe this strictly affords a loop hole for pirates to avoid the copyrights of others.

The law imposes a penalty of $100 upon any person who has not obtained copyright who shall insert the notice "*Entered according to act of Congress*," or "*Copyright*," etc., or words of the same import, in or upon any book or other article.

5. The copyright law secure to authors and their assigns the exclusive right to translate or to dramatize any of their works; no notice or record is required to enforce this right.

6. The original term of copyright runs for twenty-eight years. *Within six months before* the end of that time, the author or designer, or his widow or children, may secure a renewal for the further term of fourteen years, making forty-two years in all. Applications for renewal must be accompanied by a printed title and fee; and by explicit statement of ownership, in the case of the author, or of relationship, in the case of his heirs, and must state definitely the date and place of entry of the original copyright. Within two months of date of renewal the record thereof must be advertised in an American newspaper for four weeks.

7. The time of publication is not limited by any law or regulation, but the courts have held that it should take place within a reasonable time. A copyright may be secured for a projected as well as for a complete work. But the law provides for no *caveat*, or notice of interference—only for actual entry of title.

8. Copyrights are assignable by any instrument of writing. Such assignment, to be valid, is to be recorded in the office of the Librarian of Congress within sixty days from execution. The fee for this record and certificate is one dollar, and for a certified copy of any record of assignment, one dollar.

9. A copy of the record (or duplicate certificate) of any copyright entry will be furnished under seal of the office, at the rate of fifty cents each.

10. In the case of books published in more than one volume, or of periodicals published in numbers, or of engravings, photographs, or other articles published with variations, a copyright must be entered for each volume or part of a book, or number of a periodical, or variety, as to style, title, or inscription, of any other article. To *complete* the copyright on a book published serially in a periodical, two copies of

each serial part as well as of the complete work (if published separately), should be deposited.

11. To secure copyright for a painting, statue, or model or design intended to be perfected as a work of the fine arts, a definite title and description must accompany the application for copyright, and a mounted photograph of the same, as large as "cabinet size," mailed to the Librarian of Congress not later than the day of publication of the work or design.

The fine arts, for copyright purposes, include only painting and sculpture, and articles of merely ornamental and decorative art should be sent to the Patent Office, as subjects for Design Patents.

12. Copyrights cannot be granted upon Trade-Marks, nor upon names of companies, libraries, or articles, nor upon an idea or device, nor upon prints or labels intended to be used for any article of manufacture. If protection for such names or labels is desired, application must be made to the Patent Office, where they are registered, if admitted, at a fee of $6 for labels, and $25 for trade-marks. The names of newspapers, periodicals, books, etc., come within the trade-mark law and are not copyrightable.

13. The provisions as to copyright entry in the United States by foreign authors, etc., by act of Congress approved March 3, 1891, (which took effect July 1, 1891), are the same as the foregoing, except as to productions of persons, not citizens or residents, which must cover return postages, and are $1 for entry, or $1.50 for entry and certificate of entry (equivalent to 4*s.* 5*d.* or 6*s.* 7*d.*). All publications must be delivered to the Librarian at Washington free of charge. The free penalty labels cannot be used outside of the United States.

The right of citizens or subjects of a foreign nation to copyright in the United States extends by Presidential proclamations of July 1, 1891, April 15, and October 31, 1892, to Great Britain, France, Belgium, Switzerland, Germany, and Italy.

14. Every applicant for a copyright should state distinctly the full name and residence of the claimant, and whether the right is claimed as author, designer, or proprietor. No affidavit or witness to the application is required.

RECORD OF PHOTOGRAPHIC PATENTS.

GRANTED BY THE UNITED STATES PATENT OFFICE BETWEEN THE FIRST DAY OF SEPTEMBER, 1898, AND THE THIRTY-FIRST DAY OF AUGUST, 1899, INCLUSIVE.

Also containing a record of design patents issued and trade-marks registered within the same period.

COMPILED BY WILLIAM S. HODGES, PATENT LAWYER, WASHINGTON, D. C.

ACTINOMETERS.

616,760 dated December 27, 1898. Exposure Meter.
J. G. BAKER, Philadelphia, Pa.

ALBUMS.

618,449 dated January 31, 1899. Card or Picture Mount.
G. C. WARNER, Great Barrington, Mass.

BATHS.

619,066 dated February 7, 1899. Photographic Developer.
ALFRED BOGISCH, Feuerbach, Germany.

BURNISHING.

626,555 dated June 6, 1899. Photographic Burnisher.
U. NEHRING, New York, N. Y.

CAMERAS.

613,310 dated November 1, 1898. Folding Camera.
H. M. REICHENBACH, Rochester, N. Y.
619,792 dated February 21, 1899. Camera.
E. O. SCHAAF, Newark, N. J.
621,211 dated April 4, 1899. Folding Photographic Camera.
G. BOURRELLY, Paris, France.
622,315 dated April 4, 1899. Photographic Camera.
L. WREDE, New York, N. Y.
622,853 dated April 11, 1899. Folding Photographic Camera.
H. HILL and E. G. PRICE, London, England.
624,057 dated May 2, 1899. Reversible Back for Cameras.
H. W. LOCKE, Rochester, N. Y.
624,693 dated May 9, 1899. Photographic Camera,
B. D. SHEFFIELD, Livingstone, Mont.

CAMERAS, KINETOGRAPHIC.

610,560 dated September 13, 1899. Kinetographic Camera.
A. F PARMALAND, Paris, France.
611,231 dated September 27, 1899. Kinetographic Camera.
T. H. BLAIR, Northborough, Mass.
622,451 dated April 4, 1899. Kinetographic Camera.
O. B. DEPUE, Chicago, Ill.
629,063 dated July 18, 1889. Kinetographic Camera.
H. CASLER, Canastota, N. Y.

CAMERAS, MAGAZINE.

617,215 dated January 3, 1899. Magazine Camera.
A. ANGELL, Liverpool, England.
617,268 dated January 3, 1899. Magazine Camera.
A. L. ADAMS, London, England.
618,459 dated January 31, 1899. Magazine Camera.
H. D HAIGHT and L. L. COSSITT, Chicago, Ill.
619,695 dated February 14, 1899. Magazine Camera.
W. D. ROBINSON, Philadelphia Pa.
621,447 dated March 21, 1899. Magazine Camera.
W. H. DOERING. Philadelphia, Pa.
622,959 dated April 11, 1899. Photographic Magazine Camera.
A. LECHI, New York, N. Y.
625,379 dated May 23, 1899. Magazine Camera.
E. T. CARNS, Portland, Ore
628,302 dated July 4, 1899. Photographic Camera.
H. B. CARLTON. Rochester, N. Y.
631,222 dated August 15th, 1899. Submarine Photographic Camera.
D. MASON, New York, N. Y.
631,249 dated August 15, 1899. Magazine Plate Holder.
W. F. FOLMER, New York, N Y.
Reissue 11,757 dated July 4, 1899. Magazine Camera.
A. ANGELL, Liverpool, England.

CAMERAS, MULTIPLYING ATTACHMENT.

615,064 dated November 29, 1898. Multiplying Plate Holder.
S. DWIGHT, Mitchell, S. Dak.
618,763 dated January 31, 1899. Photographic Plate Holder.
H. H. ALTSCHWAGER and L E. JOY, Minneapolis, Minn.
620,036 dated February 21, 1899 Multiplying Camera,
J. W JENKINS. Danville, Ill.
629,542 dated July 25, 1899. Multiplying Attachment for Cameras.
T. J. BURFIELD, Waconia, Minn.

CAMERAS, PANORAMIC.

611,010 dated September 20, 1898. Panoramic Camera.
F. L. Gregory, Chicago, Ill
621,545 dated March 21, 1899. Panoramic Camera.
LeClaire Stark, Milwaukee, Wis.
624,553 dated May 9, 1899. Panoramic Camera.
C. H. Shaw, New York, N. Y.

DARK ROOMS.

615,143 dated November 29, 1898. Photographic Developing Apparatus.
W. B. Cozzens, New York, N. Y.
616,999 dated January 3, 1899. Photographic Developing Apparatus.
N. Wright, Bournemouth, England.
617,017 dated January 3, 1899. Photographic Dark Room.
N. Harrison, New York, N. Y.

EMBOSSING.

612,504 dated October 18, 1898. Apparatus for Producing Photographs in Relief.
J. C. Oliver, Versailles, Ohio.
615,025 dated November 29, 1898. Relief Photograph.
D. F. Hulbert, St. Louis, Mo.
615,026 dated November 29, 1898. Embossing Photographs.
D. F. Hulbert, St. Louis, Mo.

FINDERS.

613,430 dated November 1, 1898. Photographic View Finder.
M. H. Springsteen, Frankfort, Mich.
624,359 dated May 2, 1899. Photographic Finder.
W. Mayo, New York, N. Y.
624,517 dated May 9, 1899. Photographic Finder.
A. C. Mercer, Syracuse, N. Y.

FLASH LAMPS.

610,472 dated September 6, 1898. Flash Light Apparatus.
I. Kohn, New York, N. Y.
611,009 dated September 20, 1898. Flash Lamp.
C. H. Goodman, Bucyrus, Ohio.
613,955 dated November 8, 1898. Flash Light Apparatus.
S. D. Alter and L. T. Young, Philadelphia, Pa.
620,583 dated March 7, 1899. Flash Lamp.
H. W. Hales, Ridgewood, N. J.
623,874 dated April 25, 1899. Flash Lighting Apparatus.
P. Boyer, Paris, France.
625,133 dated May 16, 1899. Flash Light Apparatus.
S. D. Alter and L. T. Young, Philadelphia, Pa.

FOCUSING DEVICES.

622,584 dated April 4, 1899. Focusing Attachment for Cameras.
L. H. Wallace, Ogden, Utah.

KINETOSCOPES.

611,590 dated September 27, 1898. Web Feeding Mechanism.
H. Casler, Canastota, N. Y.
614,366 dated November 15, 1898. Consecutive View Apparatus.
H. Casler, Canastota, N. Y.
614,367 dated November 15, 1898. Mutoscope.
C. Casler, Canastota, N. Y.
617,435 dated January 10, 1899. Reel.
H. Casler, Canastota, N. Y.
617,643 dated January 10, 1899. Kinetoscope.
W. B. Davis, New York, N. Y.
620,357 dated February 28, 1899. Mechanism for Propelling and Exposing Films in Kinetographic Apparatus.
J. A. Prestwich, London, England.
623,410 dated April 18, 1899. Photographic Projecting Machine.
W. V. Miller and G. P. Rice, Rutherford, N. J.
627,526 dated June 27, 1899. Film Actuating Mechanism for Kinetographic Apparatus.
J. A. Prestwich, London, England.
627,952 dated June 27, 1899. Mechanism for Moving Films or Webs Intermittingly.
A. and L. Chronik, New York, N. Y.
628,413 dated July 4, 1889. Kinetographic Apparatus.
F. McMillan and A. C. Roebuck, Chicago, Ill.
629,582 dated July 25, 1899. Consecutive View Apparatus.
J. Mason, London, England.

LENSES.

622,592 dated April 4, 1899. Iris Mechanism.
E. M. Berger, Jena, Germany.

MAGIC LANTERNS.

620,033 dated February 21, 1899. Means for Advertising.
W. J. Hawkins and R. H. Wright, Partington, England.
625,627 dated May 23, 1899. Stereopticon.
S. E. Woody, Louisville, Ky.

MECHANICAL PRINTING.

625,734 dated May 30, 1899. Photo-reproduction Process and Apparatus.
J. C. Bentley, Englewood, N. J.

MOUNTING.

627,069 dated June 13, 1899. Photographic Print Holder.
J. G. Baker, Philadelphia, Pa.

PLATE HOLDER.

613,068 dated October 25, 1898. Photographic Plate Holder.
C. A. Linsay, Washington, D. C.
620,373 dated February 28, 1899. Photographic Plate Holder.
G. C. Stanley, Ithaca, N. Y.
625,275 dated May 16, 1899. Photographic Plate Holder.
M. C. Rypinski, Schenectady, N. Y.
628,889 dated July 11, 1899. Photographic Plate Holder.
W. H. Lewis, Huntington, N. Y.

PLATE HOLDERS, MAGAZINE.

619,860 dated February 21, 1899. Magazine Plate Holder.
E. R. Bullard and C. C. Smith, Wheeling, W. Va.
622,402 dated April 4, 1899. Photographic Plate Changing Apparatus.
J. Stark, Neuberg, Germany.
630,849 dated August 15, 1899. Magazine Plate Holder.
N. Bouvang, Rockford, Ill.

PRINTING AND VIGNETTING.

612,550 dated October 18, 1898 Pneumatic Photograph Printing Apparatus.
A. Schwarz, Berlin, Germany.
616,577 dated December 27, 1898. Photographic Printing Frame.
J. A. Lofstedt, Yonkers, N. Y.
628,347 dated July 14, 1899. Photographic Printing Frame.
W. McDade, Straight, Pa.

PROCESSES.

611,457 dated September 27, 1898. Art of Producing Photographs in Colors.
J. W. McDonough, Chicago, Ill.
623,491 dated April 18, 1899. Photographic Printing Process.
D. C. S. Schultz-Hencke, Berlin, Germany.
628,012 dated July 4, 1899. Photographic Printing.
T. Manly, London, England.

ROLL HOLDERS.

618,930 dated February 7, 1899. Roll Holding Camera.
E. B. Barker, Newark, N. J.
625,570 dated May 23, 1899. Roll Holding Camera.
E. Kronke, Dresden, Germany.
625,660 dated May 23, 1899. Roll Holding Camera.
W. V. Esmond, New York, N. Y.
626,356 dated June 6, 1899. Photographic Film Roll.
C. Whitney, Winnetka, Ill.
626,357 dated June 6, 1899. Photographic Film Roll.
C. Whitney, Winnetka, Ill.
631,402 dated August 22, 1899. Roll Holder Tension Device.
W. H. Lewis, Huntington, N. Y.

SHUTTERS.

612,937 dated October 25, 1898. Photographic Color Screen.
C. F. Uebelacker, Kingston, N. Y.
615,315 dated December 6, 1898. Device for Pneumatically Operating Photographic Shutter.
S. H. Smith and H. Holborn, St. Louis, Mo.
630,644 dated August 8, 1899. Time Regulator for Photographic Shutters.
H. Bate, Wolverhampton, England.

SHUTTERS, CURTAIN.

624,705 dated May 9, 1899. Photographic Shutter.
J. E. Thornton. Altringham, England.
627,027 dated June 13, 1899. Photographic Shutter.
P. and E. F. Wallis, Kittering, England.

SHUTTERS, PIVOTED.

612,476 dated October 18, 1898. Photographic Shutter.
J. L. Atwater, Western Springs, Ill.
615,296 dated December 6, 1898. Photographic Shutter.
J. A Mosher, Chicago, Ill.
615,297 dated December 6, 1898. Photographic Shutter.
J A. Mosher, Chicago, Ill
616,582 dated December 27, 1898. Photographic Shutter.
V. Odquist and J. C. Fyfe, Chicago, Ill,
618,799 dated January 31, 1899. Photographic Shutter.
J. A. Mosher, Chicago, Ill
621,332 dated March 21, 1899. Photographic Shutter.
W. V. Esmond, New York, N. Y.
622,611 dated April 4, 1899 Photographic Shutter.
W. V. Esmond, New York N. Y
622,955 dated April 11, 1899. Photographic Shutter.
F. H. Kelley. Providence, R I.
624,729 dated May 9, 1899. Photographic Shutter.
R. S. Atwater, Western Springs, Ill.

SHUTTERS, SLIDING.

617,900 dated January 17, 1899. Photographic Shutter.
G. C. O. Lange, Cresskill, N. J.

STEREOSCOPES.

622,480 dated April 4, 1899. Reflector for Use in Photochromoscopes, etc.
F. E. Ives, Philadelphia, Pa.
624,042 dated May 2, 1899. Pictorial Reproduction.
J. Jacobson, Boston, Mass.

STUDIO ACCESSORIES.

610,808 dated September 13, 1898. Photographic Background Carrier.
M. C. Harriman, Cheboygan, Mich.
624,111 dated May 2, 1899. Photographic Background Carrier.
C. A. Snow, Lime Springs, Iowa.
624,164 dated May 2, 1899. Photographic Lighting Apparatus.
G. Bouilland, Macon, France.

SURFACES, SENSITIVE.

611,409 dated September 27, 1898. Multiple Coated Carbon Film.
Corwin Gitchell, San Francisco, Cal.
624,837 dated May 9, 1899. Sensitized Photographic Paper.
V. Matthieu and F Devy, Paris, France
625,527 dated May 23, 1899. Photosensitive Composition.
R. B. West, Guilford, Conn.

TRAYS AND TANKS.

610,392 dated September 6, 1898. Photographic Developing Apparatus.
M. Fernekes, Milwaukee, Wis.
616,152 dated December 20, 1898. Photographic Tray.
J. H. Smith, Chicago, Ill.
617,335 dated January 10, 1899. Photographic Plate Washer.
F. R. Hall, Boston, Mass.

620,565 dated March 7, 1899. Photographic Washing Box.
H. Burke and D. James, Chicago, Ill.
622,141 dated March 28, 1899. Photographic Developing Apparatus.
A. Gooder, Brookville, Pa.
623,837 dated April 25, 1899. Photographic Developing Apparatus.
A. Schwarz, Berlin, Germany.
628,917 dated July 18, 1899. Photographic Washing Apparatus.
C. W. Blodget, New York, N. Y.
630,500 dated August 8, 1899. Photographic Developing Apparatus.
J. K. Graeme, Washington, D. C.

TRIPODS.

619,659 dated February 14, 1899. Tripod Stand.
J. W. Bennetto, Newquay, England.
621,571 dated March 21, 1899. Tripod Stand.
S. C. Jones and W. Mayo, Rochester, N. Y.
624,340 dated May 2, 1899. Tripod Stand.
S. C. Jones and W. Mayo, Rochester, N. Y.
625,392 dated May 23, 1899. Camera Base.
L. Von Grave, Wallingford, Conn.
627,170 dated June 20, 1899. Tripod.
H. E. Auston, Trevorton, Pa.
627,629 dated June 27, 1899. Camera Support.
H W. Voss, New York, N. Y.
629,379 dated July 25, 1899. Photographic Tripod.
W. H. Lewis, Huntington, N. Y.
630,219 dated August 1, 1899. Tripod Head.
C. W. J. Hayes, Detroit, Mich.
630,220 dated August 1, 1899. Tripod.
C. W. J. Hayes, Detroit, Mich.
630,221 dated August 1, 1899. Tripod Head.
C. W. J. Hayes, Detroit, Mich.
631,831 dated August 15, 1899. Adjusting Device Between Tripods and Cameras of Photographic Apparatus.
A. H. Spurr. Creston, Iowa.
632,064 dated August 29, 1899. Tripod.
D. J. Roberts, Pittsburgh, Pa.

DESIGNS.

30,329. Mezzotint Print. Granted to C. S. Harris, Philadelphia, Pa., for seven years.
30,514. Photographic Card Mount. Granted to J. P. Odgers, Philadelphia, Pa., for seven years.
31,074. Photographic Card Mount. Granted to J. P. Odgers, Philadelphia, Pa., for seven years.
31,213. Photographic Mount. Granted to P. J. Stuparich, San Francisco, Cal., for seven years.

TRADE MARKS.

32,541. The Photo-Optical Co., London, England.
Essential feature the word "Wehges" applied to Lenses for Photographic and Optical Purposes. Used since June 6, 1898.
32,685. Société Anonyme des Plaques et Papiers Photographiques, Lyon-montplaisir, France.
Essential feature the representation of a label of oblong form having midway of its length an oval figure. Applied to Photographic Chromos and Plaques in Colors. Used since June 1, 1898
33,016. J. Hauff & Co., Feuerbach, Germany.
Essential feature the word "Gem" applied to Photographic Developers. Used since February 3, 1899.
33,017. J. Hauff & Co., Feuerbach, Germany.
Essential feature the word "Duralin" applied to Photographic Developers. Used since February 1, 1899.
33,018. Haller-Kemper Co., Chicago, Ill.
Essential feature the word "Sensitol" applied to Sensitizing Material. Used since April 24, 1899.
33,409. Haller-Kemper Co., Chicago, Ill.
Essential feature the word "Kruxo" applied to Sensitized Paper. Used since April 1, 1899
33,417. Actien-Gesellschaft für Anilin Fabrikation, Berlin, Germany.
Essential feature the word "Eikonal" applied to Photographic Developers. Used since July 3, 1899.
33,418. Actien Gesellschaft für Anilin Fabrikation, Berlin, Germany.
Essential feature the word "Imogen" applied to Photographic Developers. Used since December 2, 1897.

RATES OF DOMESTIC POSTAGE

TO ANY PART OF THE UNITED STATES, CANADA, OR MEXICO.

SEE NOTE H.

	cts.	oz.	See Spec'l Note.
Address Tags	1	1	*a*
Bill Heads	1	1	*a*
Blotters (printed)	1	1	*a*
Blue Prints	1	2	*d*
Books, printed	1	2	*d*
Cards, playing	1	1	*a*
" printed	1	2	*a*
" business	1	2	*a*
" Christmas, etc.‡	1	2	*a*
" Easter‡	1	2	*a*
" New Year‡	1	2	*a*
Chromos‡	1	2	*a*
Catalogues	1	2	*d*
Circulars	1	2	*d*
Coins	1	1	*a b*
Copy (MSS.)	2	1	*e*
" (with proof sheets)	1	2	*e*
Crayon	1	1	
Desk Blotters	1	1	*a*
Drawings } Pen or Pencil Designs } Pen or Pencil	1	1	* *e*
Easter Cards‡	1	2	*a*
Engravings	1	2	*a*
Handbills	1	2	*a*
Letters	2	1	*e*
Labels (printed)	1	2	*a*
Lithographs	1	2	*a*
Manifold Letters	2	1	*e*
Manuscript	2	1	*e*
Magazines	1	4	*d*
Merchandise	1	1	*a b*
Maps (printed)	1	2	*e*
Newspapers	1	4	*d*
New Year Cards‡	1	2	
Packages, sealed	2	1	*b*
Packages, unsealed	1	1	† *b*
Pamphlets	1	2	*d*
Patterns (cut)	1	1	*a*
Periodicals	1	4	*d*
PHOTOGRAPHS	1	2	*d*
Pictures (scrap)	1	2	
Playing Cards	1	1	*a*
Postal Cards	1	ea.	*f*
Printed Matter (*not merchandise or samples*)	1	2	*d*
Printed Envelopes	1	1	*a*
Prospectuses	1	2	*d*
Proof Sheets	1	2	*d g*
Plans (in writing)	2	1	*e*
Registration	8	ea.	*i*
Samples	1	1	*b*
Sample copies of regular publications mailed by publisher (second-class)	1	lb.	
Sample copies of regular publications not mailed by publisher	1	4	*a*
Scrap Pictures	1	2	*a*
Seeds, Plants, etc.	1	2	
Specie	1	1	*a b*
Stereoscopic Views	1	2	*d*
Tickets	1	2	*a*
Type Writer Work	2	1	*e*
Valentines (if printed without embellishment with silk, satin, etc.)	1	2	*a*
Visiting Cards (printed)	1	2	*a*

* If pen or pencil drawings contain no written letters, figures, or words, they are fourth class matter, otherwise first class.

† May be either third or fourth class.

‡ Third-class matter if printed on paper; if on silk, cotton, satin, canvas, or other material than paper or paper board, fourth class matter.

GENERAL NOTES.

Cards, circulars, catalogues, etc., relating to the business of one or more firms, and different articles of all kinds and classes, may be placed in the same package, provided that the highest rate of postage that any part of the contents is subject to shall be prepaid on the whole package.

The following articles are unmailable, and will not be dispatched in any case:—Spirituous, malt, or vinous liquids, poisons, explosive matter, inflammable articles, live or dead animals, insects (except queen bees when safely secured), substances exhaling a bad odor, fresh fruits and vegetables, obscene or indecent books, prints, writings, or papers; all postal cards or letters on the envelopes of which lewd, obscene, or lascivious deliniations, offensive duns, epithets, terms, or language are written or printed, all matter concerning lotteries or schemes devised and intended to defraud the public, or for the purpose of obtaining money under false pretences, and all mail matter not addressed to a post-office or to no particular person, firm, company, or publication.

Special Delivery.—Any mail matter, when bearing, in addition to the regular postage, a "special delivery" stamp (face value, ten cents), will be immediately delivered by special messenger on its arrival at destination, between the hours of 7 A.M. and 7 P.M., and within one mile from the post-office, if it be not a letter-carrier office. At letter-carrier offices special delivery is obligatory within the carrier limits, and between the hours of 7 A.M. and 11 P.M.

Note A.

Fourth Class Matter.—All Matter Not Included in First, Second and Third Classes.—Weight limited to 4 pounds. Postage must be fully prepaid. The rate is *one cent an ounce or fraction thereof.* Fourth Class matter may have printing on it or on the wrapper. Written marks, in addition to the address, are allowed on Fourth Class matter as follows:—The name and address of the sender preceded by the word "From"; and any names, numbers, marks, or letters for the pupose of description. A request to the delivering Postmaster may also be written asking him to notify sender if the package is not delivered, and the amount required to prepay postage for its return.

Note B.

Articles of the Fourth Class liable to injure or deface the mails, such as glass, needles, nails, pens, etc., must first be placed in a bag, box or open envelope, which must then be inclosed in another outside tube or box made of metal or hardwood, without sharp corners or edges and having a sliding clasp or screw lid, thus securing the articles in a double package; if the articles are fragile, they must be packed with sawdust, cotton or other packing material in the inside pocket. Powdered articles, such as flour, sugar, etc., may be inclosed in a transparent bag or envelope, and must be securely packed so as to prevent breaking. Admissible liquids and oils (not exceeding 4 ounces liquid measure), pastes, salves or articles easily liquefiable, must conform to the following conditions: When in glass bottles or vials, such bottles or vials must be strong enough to stand the shock of handling in the mails, and must be inclosed in a wooden or papier-mache block or tube *not less than three-sixteenths of an inch thick* in the thinnest part, strong enough to support the weight of mails piled in bags and resist rough handling; and there must be pro-

vided, between the bottle and its wooden case, a cushion of cork crumbs, cotton, felt, asbestos, or some other absorbent, sufficient to protect the glass from shock in handling; the block or tube impervious to liquids, including oils, etc., to be closed by a tightly fitting screw-lid of wood or metal, with a rubber or other pad so adjusted as to make the block or tube water-tight and to prevent the leakage of the contents in case of breaking of the glass. When inclosed in a tin cylinder, metal case or tube, such cylinder, case or tube should have a screw-lid with a rubber or cork cushion inside in order to make the same water-tight, and should be securely fastened in a wooden or papier-mache block (open only at one end), and not less in thickness and strength than above prescribed. Manufacturers or dealers intending to transmit articles or samples in considerable quantities, should submit a sample package, showing their mode of packing, to the Postmaster at the mailing office, who will see that the conditions of this section are carefully observed.

Note D.

THIRD CLASS MATTER—PREPAYMENT.—Postage must be fully prepaid, otherwise the matter will be "held for postage." The rate is *one cent for every two ounces or fraction thereof. The limit of weight is* 4 pounds, except on single books. WRITING.—No writing is permitted on Third Class matter, except as follows: The name and address of the sender on the outside or inside of package, preceded by the word "From," and any printing not in the nature of personal correspondence. The sender is further allowed to mark a word or passage in a book or paper to which he desires to call special attention. He may also write a simple inscription or dedication upon the cover or blank leaf of a book or pamphlet. The date, address and signature of a circular may be written. Any other writing on Third Class matter will subject the package to letter rates of postage, and may render the sender liable to a fine of ten dollars. *Photographs* and *blue prints* must bear no other writing than the name of the view and of the sender.

WRAPPING.—Mail matter of the Third Class must be so wrapped or inclosed that it can be readily examined without destroying the wrapper; otherwise it will be subject to postage at the First Class rate (two cents per ounce), as will all articles inclosed in sealed envelopes with clipped ends, sides or corners, or in boxes with covers secured by nails, and all packages the wrappers of which are secured to the inclosure by postage stamps.

Note E.

FIRST CLASS.—This class includes letters, postal cards, sealed packages, all matter wholly or partly in writing (whether manuscript or produced by type-writer or copying press), drawings, designs, plans and maps, if they contain descriptive words, letters or figures in writing, produced by hand, manuscript for publication not accompanied by proof-sheets, and all personal correspondence, whether in writing or in print. (See under heads "Third Class," "Fourth Class," notes "A" and "D," certain writing permitted in or on articles of those classes.)

The rate of postage on mail matter of the First Class (sealed or unsealed) is *two cents for each ounce or fraction thereof*, excepting postal cards, and excepting also letters for *local delivery* posted at the post-offices where no letter-carriers are employed, in which case the rate is *one cent per ounce or fraction thereof*.

The law provides that the postage on all mail matter of the First Class shall be prepaid only by postage stamps or by inclosure in government

stamped envelopes, and that any article of this class (not entitled by law to free transmission in the mails) deposited in a post-office wholly unpaid or prepaid *less than one full rate, cannot be forwarded or delivered*, but must be "held for postage." LIMIT OF WEIGHT.—There is no limit to the weight of letters or packages of First Class matter. WRAPPING OR ENCLOSURE.—Mail matter of the First Class may be wrapped or enclosed in any manner that the sender may desire. RETURN.—Letters not delivered will be returned to writer free, if a request to that effect is placed on the envelope. FORWARDING.—A letter will be forwarded by the Postmaster who may hold it, to another post-office, at the request of the person to whom the letter is addressed. Letters addressed to the care of another person, or erroneously delivered, may be redirected and returned within a reasonable time to post-office, and will be forwarded without additional charge.

The putting on of requests to return the matter to the sender in case of non-delivery is recommended by the Post-Office Department—not on first-class alone, but on all matter.

Note F.

POSTAL CARDS.—"Postal Cards" are those issued by authority of the Postmaster-General (the imitation of which is forbidden and punished by law). Nothing whatever may by attached to a Postal Card except an address label, which may be pasted to the message as well as the *address side*, and no printing or writing is permitted upon the address side of Postal Cards, except that imprinted thereon at the manufactory and such as may be necessary for the proper direction of the same. Postal Cards are unmailable as such when incomplete or mutilated, and in all cases where any of the above conditions are not complied with. Undelivered single Postal Cards are not returned to senders. 1. Cards must not exceed the size of what is now known as the "H" postal card, which is 3¼ by 5½ inches in dimensions, nor must they be smaller than the "K" postal card, the size of which is 2 15-16 by 4 15-16 inches. 2. The quality of the cards must be substantially that of the Government Postal Cards, and weigh about 6 pounds 3 ounces to the thousand. 3. The color of the cards may be white, cream, light gray, or the shade of the government card, which is light buff. 4. The cards must bear these words, in print, on the address side: "Private Mailing Card—Authorized by act of Congress of May 19, 1898." When prepared by printers or stationers for sale, they should also bear in the upper right-hand corner of the address side an oblong diagram with the words, "Place a one-cent stamp here"; and in the lower left-hand corner the following words should be printed: "This side is exclusively for the address." Nothing else than the superscription, which may be either in writing or print, but which must be limited to the name and address, and, if desired, the occupation or business of the addressee, briefly stated, will be allowable on the address side. 5. The message on the cards may be either in writing or print; and there may also appear on the message side advertisements, illustrations, or other matter printed either in black or in colors. 6. There must be attached to every card mailed a one-cent adhesive postage stamp. 7. The privilege given by the act is not intended to work a discontinuance of the Government postal cards. These will be issued and sold the same as heretofore. 8. Private mailing cards, with written messages, cannot be mailed to foreign countries except at the letter rate of postage.

Note G.

PROOF SHEETS may be corrected or uncorrected, with or without the original manuscript, additions to or alterations in the matter, or directions as to the typographical part of the work; but directions in writing as to binding, quality of paper, etc., are not permissible unless the letter rate of postage be paid.

Note H.

CANADA AND MEXICO.—Matter mailed in the United States, addressed to Mexico, is subject to the same postage rates and conditions as it would be if it were addressed for delivery in the United States, except that articles of miscellaneous merchandise (fourth-class matter) not sent as *bona-fide* trade samples, are required to be sent by "Parcels Post," and that the following articles are *absolutely excluded* from the mails without regard to the amount of postage prepaid, or the manner in which they are wrapped, viz.:

All sealed packages, other than letters in their usual and ordinary form; *all* packages (including packages of second-class matter, which weigh more than 4 pounds 6 ounces), except such as are sent by "Parcels Post;" liquids, pastes, confections and fatty substances; publications which violate any copyright law in Mexico.

Single volumes of printed books in *unsealed* packages, are transmissible to Mexico in the regular mails without limit as to weight.

"*Commercial Papers*," and *bona-fide* trade samples are transmissible to Mexico in the regular mails at the postage rate given above, opposite "Commercial Papers" and "Samples of Merchandise," respectively. See also Note 14, pp. 925 and 927 of the *United States Official Postal Guide* for January, 1894.

Matter mailed in the United States, addressed to Canada, is subject to the same postage rates and conditions as it would be if it were addressed for delivery in the United States, except that "Commercial Papers" are transmissible at the postage rate given above opposite "Commercial Papers"; that packages of seed, plants, etc., are subject to the postage rate of one cent per ounce, and that the following articles are *absolutely excluded* from the mails, without regard to the amount of postage prepaid, or the manner in which they are wrapped, viz.:

All sealed packages, other than letters in their usual and ordinary form; *all* packages (except single volumes of printed books and packages of second-class matter), which weigh more than 4 pounds 6 ounces; Police Gazettes; publications which violate any copyright law of Canada.

UNITED STATES POSTAL AGENCY AT SHANGHAI, CHINA.—Articles addressed for delivery at the following places in China, viz.: Cheefoo (or Yenti), Chin Kiang, Chung King, Kaiping, Kalgan, Kiukiang, Nanking, Newchwang, Ningpo, Ourga, Peking, Hang Chow, Hankow, Ichang, Shanghai, Taku, Tientsin, Wenchow, Wuchang, Wuhu, are transmissible in the mails made up in San Francisco for the United States Postal Agency at Shanghai. See "Shanghai" in the Foreign Postage Table on page 20.

Note 1.

REGISTRATION.—All kinds of mail matter can he registered at the rate of eight cents for each package, in addition to the postage at regular rates, both postage and fee to be fully prepaid by stamps; all conditions as to marks, contents and method of securing packages being the same as described under the various classes (Notes A, D, E). Each package must bear name and address of sender, and a receipt will be returned from the person to whom addressed.

DOMESTIC MONEY ORDERS.

For Orders not exceeding	$2 50					$0 03
" exceeding	$2 50	and not exceeding	$5 00			05
" "	5 00	" "	10 00			08
" "	10 00	" "	20 00			10
" "	20 00	" "	30 00			12
" "	30 00	" "	40 00			15
" "	40 00	" "	50 00			18
" "	50 00	" "	60 00			20
" "	60 00	" "	75 00			25
" "	75 00	" "	100 00			30

(Postal Notes no longer issued.)

The sender of a money order must state the particulars thereof upon a form furnished by the post-office.

A money order may be endorsed once only.

The person who presents a money order for payment must be identified if unknown to the postmaster, unless the remitter upon his application waives identification.

A domestic money order may be repaid within a year at the office of issue. The fee will not be refunded.

Duplicates of lost or invalid money orders are issued by the department free of charge upon application made through the issuing or paying postmaster by remitter, payee or indorsee.

The issue of money orders on credit is prohibited.

A money order may be paid to a second person by endorsement of payee, or upon a written order or power of attorney to be filed with the paying postmaster.

INTERNATIONAL MONEY ORDERS.

International money orders may be drawn for payment in the following countries and places:

The fees for International Money Orders are as follows:

For sums not exceeding $10.....	$0 10	Over $50 and not exceeding $60.....	$0 60
Over $10 and not exceeding $20.....	20	" 60 " " 70.....	70
" 20 " " 30.....	30	" 70 " " 80.....	80
" 30 " " 40.....	40	" 80 " " 90.....	90
" 40 " " 50.....	50	" 90 " " 100.....	1 00

Order Should be Sent by Remitter to Payee.

*Alexandria, Egypt, if drawn as a French order.
Algeria.
Amoy, China.
Bahama Islands.
Bermudas.
Beyroot, Turkey, if drawn as a French order.
British Bechuanaland, South Africa.
British Guiana.
Canada.
Canton, China.
Cape Colony, South Africa.
Constantinople, Turkey, if drawn as British or French.
Foochow, China.
France.
Great Britain and Ireland.
Hankow, China
Hawaiian Islands.
Hoihow, China.
Hong Kong, China.
Jamaica.
Leeward Islands.
Newfoundland.
New South Wales.
New Zealand.
Ningpo, China.
North Borneo or Sandakan.
Orange Free State, South Africa.
Panama.
Port Said, Egypt.
Queensland.
Retimo, Crete, if drawn as a French order.
Salonica, Turkey, if drawn as a French order.
Sarawak, Sandakan, Borneo.
Shanghai, China.
Smyrna, Turkey, if drawn as a French order.
South Australia.
Swatow, China.
Tangier, Morocco, if drawn as on French.
Tasmania
The Dardanelles.
Transvaal, South Africa.
Tripoli, Africa.
Tobago, West Indies.
Tunis, Africa.
Trinidad, West Indies.
Victoria, Australia.
Windward Islands.
Zanzibar, Africa, if drawn as a French order.

Order May be Kept by Remitter as a Receipt.

Accra, Gold Coast, Africa.
Aden, Arabia.
Adrianople, Turkey.
*Alexandria, Egypt, if drawn as a British or Egyptian order.
Archipelago of Banca, Dutch East Indies.
Archipelago of Billiton, Dutch East Indies.
Archipelago of Riouw, Dutch East Indies.
Assab, Africa.
Austria-Hungary.
Avlona or Valona, Turkey.
Azores.
Bagamoyo, East Africa.
Bagdad, Turkey.
Banana, Congo Free State.
Bassorah, or Basra, Turkey.
Bathurst, Gambia, Africa.
Belgium.
Belize, British Honduras.
Beluchistan, Asia.
Beyroot, Turkey, if drawn as British or Austrian.
Boma, Congo Free State.
Borneo.
Bosnia.
British Honduras.
Bulgaria.
Bunder Abbas or Gombroon, Persia.
Burmah, Asia.
Bushire, or Abu'-Shehr, Persia.
Caipha (or Haifa), Turkey.
Cameroons, Cameroons, Africa.
Candia, Crete, Turkey.
Canea, Crete, Turkey.
Cape Coast Castle, Gold Coast, Africa.
Celebes.
Ceylon.
Chios or Scio, Turkey in Asia.
Constantinople, Turkey, if drawn as Austrian.
Cyprus.
Danish West Indies.
Dar es Salaam, Africa.
Denmark.
Durazzo, Turkey.
Dutch East Indies.
Egypt.
Falkland Islands.
Faroe Islands.
Fiji Islands.
Finland.
Gambia, Africa.
Germany.
Gibraltar.
Gold Coast Colony, Africa.
Guadur or Gwadel, Beluchistan.
Haifa or Caipha, Turkey.
Heligoland.
Herzegovina.
Honduras.
Iceland.
India, British.
Italy.
Jaffa, Turkey.
Japan.
Java.
Jask, Persia.
Jerusalem, Turkey.
Kerassunde, Turkey.
Kilwa, Africa.
Klein-Popo, or Little Popo, Togo, Africa.
Lagos, Africa.
Labuan, Borneo.
Lamu, Africa.
Lindi, East Africa.
Linga, or Lingor, Persia.
Little Popo, or Klein-Popo, Togo, Africa.
Lome, Togo, Africa.
Luxemburg, Grand Duchy.
Madeira Islands.
Madura, Dutch East Indies.
Malacca, Straits Settlements.
Malta.
Massowah, Africa
Matadi, Congo Free State.
Mauritius.
Mitylene, Turkey.
Molucca Islands.
Mombasa, Africa.
Muscat, Arabia.
Natal, South Africa.
Netherlands.
Norway.
Panzani, Africa.
Penang, Straits Settlements.
Persia.
Portugal.
Previsa, Turkey.
Retimo, Crete, if drawn as an Austrian order.
Rhodes, Turkey.
Roumania.
Saadani, East Africa.
Saint Helena.
Salonica, Turkey, if drawn as British or Austrian.
Salt Pond, Gold Coast.
Salvador, Central America.
Samsun, Turkey.
Santi, Quaranta, Turkey.
Scio, Chios, Turkey.
Servia.
Seychelle Islands.
Siam.
Sierra Leone, Africa.
Singapore, Straits Settlements.
Smyrna, Turkey, if drawn as Austrian.
Straits Settlements.
Sweden.
Switzerland.
Sumatra.
Tanga, Africa.
Tangier, Morocco, if drawn as British.
Trebizond, Turkey.
Turk's Island, West Indies.
Valona, Turkey.
Victoria, Cameroons, Africa.
West Coast of Africa.
Western Australia.
Zanzibar, Africa, if drawn as a British order.

* N. B.—Money orders intended for payment to persons residing in Egypt should now be drawn as Egyptian, not as British or French.

RATES OF POSTAGE TO FOREIGN COUNTRIES.

UNIVERSAL POSTAL UNION.

Treated concluded at Vienna, Austria, July 4, 1891.

	Cts.
Letters, per 15 grams or ½ ounce	5
Postal Cards, each	2
Postal Cards, with paid reply, each	4
Commercial Papers, { First 10 ounces or fraction thereof	5
Commercial Papers, { Every additional 2 ounces	1
Samples of Merchandise, { First 4 ounces	2
Samples of Merchandise, { Every additional 2 ounces	1
Registration Fee on letters or other articles	8

All correspondence other than letters must be prepaid at least partially.

COUNTRIES OR PLACES WHICH, WITH THE UNITED STATES, ARE COMPRISED IN THE UNIVERSAL POSTAL UNION, AND TO WHICH THE ABOVE RATES APPLY.

FOREIGN MAILS.

NOTE 4.—Countries and colonies of the Universal Postal Union other than the United States: ARGENTINE REPUBLIC, including eastern parts of Patagonia and Terra del Fuego and Staten Island.

Ascension—Island of (British Colony).

AUSTRIA-HUNGARY, including the Principality of Lichtenstein.

AUSTRALIA.—See the separate colonies in their alphabetical order.

BAHAMAS.

BARBADOS, W. I.

BELGIUM.

BERMUDAS.

BOLIVIA.

BOSNIA-HERZEGOVINA.

BRAZIL.

BRITISH COLONIES on West coast of Africa (Gold Coast, Lagos, Senegambia and Sierra Leone).

BRITISH COLONIES IN WEST INDIES, viz.: Antigua, Dominica, Montserrat, Nevis, St. Christopher, the Virgin Isles, Grenada, St. Lucia, Tobago and Turk's Islands.

BRITISH GUIANA.

BRITISH HONDURAS.

BRITISH INDIA: Hindostan and British Burmah (Aracan, Pegu, and Tenasserim), and the Indian Postal Establishments of Aden, Muscat, Persian Gulf, Guadur, Mandalay.

BULGARIA, Principality of.

CANADA.

CEYLON.

CHILE, including western parts of Patagonia and Terra del Fuego.

COLOMBIA, Republic of.

COLONY OF THE CAPE OF GOOD HOPE, including Basutoland, Griqualand, Little Namaqualand, Pondoland, Tembuland, Transkei, Walfish Bay, and Bechuanaland.

CONGO, Independent State of.

COSTA RICA.

CYPRUS, Island of.

DANISH COLONIES of St. Thomas, St. Croix and St. John.

DENMARK, including Iceland and the Faroe Islands.

DOMINICAN REPUBLIC.

EAST AFRICA, British Protectorate of.

ECUADOR.

EGYPT.

FALKLAND ISLANDS.

FIJI ISLANDS, Colony of.

FRANCE, including Algeria, the Principality of Monaco, and French post office establishments in Morocco, at Shanghai (China), and in Zanzibar, Cambodia, Annam and Tonquin.

FRENCH COLONIES;

1. *In Asia:* French establishments in India (Chandernagare, Karikal, Mahé, Pondicherry, Yanaon); and in Cochin China (Saigon, Mytho, Bien-Hoa, Poulo-Condor, Vinghi Long, Hatien, Tschandok).
2. *In Africa:* Senegal and dependencies (Goré, St. Louis, Bakel, Dagana); Mayotte and Nossi-be, French Congo-Gaboon (including Grand Bassam and Assinie); Reunion (Bourbon); Madagascar; and Obock on the east coast.
3. *In America:* French Guiana, Guadeloupe and dependencies (Désirade or Deseada, Les Saintes, Marie Galante, and the north portion of St. Martin), Martinique, St. Bartholomew, St. Pierre and Miquelon.
4. *In Oceanica:* New Caledonia, Tahiti, Marquesas Islands, Isle of Pines, Loyalty Islands, the Archipelagoes of Gambier Toubouai, and Tuamotou (Low Islands).

GERMANY, including the Island of Heligoland and the German post office at Apia (Samoan Islands), and at Shanghai (China).

GERMAN PROTECTORATES:

Territory of Cameroons (or Kameroun) West coast of Africa); Territory of the New Guinea Company (in Papua); Territory of South West Africa (Grand Namaqua, the Damaras Country, and the southern portion of Ovambo, between Cape Colony and Angola): Territory of Togo (Western Africa); Territory of East Africa; the Marshall Islands, in the Pacific Ocean.

GIBRALTAR, and its Postal Agencies in Morocco.

GREAT BRITAIN AND IRELAND.

GREECE, including the Ionian Isles.

GREENLAND.

GUATEMALA.
HAITI.
HAWAII.
HONDURAS, Republic of, including Bay Islands.
HONG-KONG and the post office maintained by Hong-Kong at Klung-Chow, Canton, Swatow, Amoy, Foo-Chow, Ning-po, Shanghai and Hankow (China).
ITALY, including the Republic of San Marino, the Italian offices of Tunis and Tripoli in Barbary; Massonah, Assab, Asmara and Keren (in the Italian Colony of Eritrea—Abyssinia).
JAMAICA.
JAPAN, including Formosa, and Japanese post offices at Shanghai (China), and Fusam-po, Genzanshin and Jinsen (Corea).
LABUAN.
LIBERIA,
LUXEMBURG.
MALTA and its dependencies, viz.: Gozzo, Comino and Cominoto).
MAURITIUS and dependencies (the Amirante Islands, the Seychelles and Rodrigues).
MEXICO.
MONTENEGRO.
NATAL, Colony of, including Zululand.
NETHERLANDS.
NETHERLANDS COLONIES:

1. *In Asia:* Borneo, Sumatra, Java (Batavia), Billiton, Celebes, (Macassar). Madura, the Archipelagoes of Banca and Rhio (Riouw), Bali, Lombok, Sumbawa, Flores, the S. W. portion of Timor and the Moluccas.
2. *In Oceanica:* The N. W. portion of New Guinea (Papua).
3. *In America:* Netherlands Guiana (Surinam), Curacao, Aruba, Bonaire, part of St. Martin, St. Eustatius and Saba.

NEWFOUNDLAND.
NEW GUINEA, British Colony of.
NEW SOUTH WALES, Colony of, including Lord Howe Island and the Norfolk Islands.
NEW ZEALAND, Colony of, including Chatham Island.
NICARAGUA.
NORTH BORNEO, British Colony of.
NORWAY.
THE ORANGE FREE STATE.
PARAGUAY.
PERSIA.
PERU.
PORTUGAL, including the Island of Madeira and the Azores.
PORTUGUESE COLONIES:

1. *In Asia:* Goa, Damao, Diu, Macao, and parts of Timor.

2. *In Africa:* Cape Verde, Bissao, Cacheo, Islands of St. Thomé and Princes, Ajuda, Mozambique, and the province of Angola.

Queensland, Colony of.

Roumania (Moldavia and Wallachia).

Russia, including the Grand Duchy of Finland.

Salvador.

Samoan (Navigators) Islands, German post office at Apia.

Sarawak—British Protectorate of.

Servia.

Siam.

South African Republic (The Transvaal).

Spain, including the Balearic Isles, the Canary Islands, the Spanish possessions on the north coast of Africa (Ceuta, Penon de la Gomera, Alhucemas, Melilla, and the Chaffarine Islands), the Republic of Andorro, and the postal establishments of Spain on the west coast of Morocco (Tangier, Tetuan, Larrache, Rabat, Mazagan, Casablanca, Saffi, and Mogador).

Spanish Colonies:

1. *In Africa:* Islands of Fernando Po, Annobon, and Corisco.
2. *In America:* Cuba and Puerto Rico.
3. *In Oceanica:* The Archipelagoes of the Mariana (Ladrone) and the Caroline Islands.
4. *In Asia:* The Philippine Archipelago (Luzon, with Manila, Mindanao, Palawan, Pemay, Amar, etc.), and its dependencies Soulou, Marianna, Caroline, Palaos or Pelew Islands.

Straits Settlements (Singapore, Penang, and Malacca).

St. Helena—Island of (British Colony).

St. Vincent, W. I.

South Australia, Colony of.

Sweden.

Switzerland.

Tasmania, Colony of.

Trinidad, W. I.

Tunis, Regency of.

Turkey (European and Asiatic).

Uruguay.

Venezuela.

Victoria, Colony of.

West Australia, Colony of.

Zanzibar, British Protectorate of.

FOREIGN POSTAGE TABLE.

SHOWING THE RATES OF POSTAGE CHARGEABLE IN THE UNITED STATES ON MAIL MATTER FOR FOREIGN COUNTRIES.

b. Articles destined for places marked "*b*" cannot be sent under registration *through to destination*.

c. Prepayment of postage on ordinary letters is optional *with senders*. Full prepayment is required upon *all registered articles*; and postage upon all articles other than letters is required to be prepaid, at least in part. If the postage is not prepaid *in full*, *double* the amount of the deficiency will be collected of the addressee when the article is delivered.

d. On articles for places marked "*d*" additional postage may be collected on delivery; the rates stated in this Table being fixed to cover the postage charges to the port of debarkation only.

e. For the rates and conditions applicable to articles sent by "Parcels-Post" to certain foreign countries see the heading "*Parcels-Post*."

Countries or Places of Destination.	Letters per 15 Grams. or ½ oz.	POSTCARDS.		Registration Free,	Printed Matter of All Kinds per 2 oz.	Commercial Papers per 2 ozs.	Samples of Merchandise per 2 ozs.
		Single, each.	With Paid Reply, each.				
1.	2.	3.	4.	5.	6.	7.	8.
All of the Countries and Colonies of the Universal Postal Union, except Canada and Mexico.—See Note 4.	Cents. 5.	Cents. 2.	Cents. 4.	Cents. 8.	Cents. 1.		
Canada.—See Note H. At least one single rate of postage (two cents) must be prepaid on ordinary letters. Plants and seeds are subject to the rate of one cent per ounce. "Printed matter" is subject to the domestic rates. Mexico.—See Note H. At least one rate of postage (two cents) must be prepaid on ordinary letters.	U. S. Domestic Rates	U. S. Domestic Rates.	U. S. Domestic Rates.	U. S. Domestic Rates.	U. S. Domestic Rates.		
Countries and Colonies *Not* in the Universal Postal Union, Viz: AFRICA: (*b*) (*d*). Abyssinia.—Articles may be registered for delivery at Djibouti, Somali Coast. Bechuanaland Protectorate, including Kanye. Lake Nyassi, Maeloutsie, Mashonaland, Matabeleland, Molepolole, Palachwe [Khamastown]. Shoshong, Tati River, and Zambesi. British Central Africa, including British Nyasseland, Barotse, Lake Moero, Tanganyika, and upper Zambesi. Comoro Islands.—(Grand Comoro, Anjouan Mohele), Madagascar.—Native Possessions. Morocco, except European post offices.	5.	2.	4.	8.	1.	The same as for "printed matter," except that the lowest charge on any package, whatever its weight, is 5 cents.	The same as for "printed matter," except that the lowest charge on any package, whatever its weight, is 2 cents.

FOREIGN POSTAGE TABLE.—*Continued.*

Countries and Colonies *Not* in the Universal Postal Union, Viz:	Letters per 15 Grams. or ½ oz.	POSTCARDS.		Registration Free,	Printed Matter of All Kinds per 2 Ozs.	Commercial Papers, per 2 Ozs.	Samples of Merchandise per 2 Ozs.
		Single, each.	With Paid Reply, each.				
1.	2. Cents.	3. Cents.	4. Cents.	5. Cents.	6. Cents.	7.	8.
AFRICA: (*b*) (*d*)—*Continued.*							
Niger Coast Protectorate, including Benin, Bonny, Brass, Calabar [New and Old], Opobo, and Waree or Foreados.	5.	2.	4.	8.	1.	The same as for "printed matter," except that the lowest charge on any package, whatever its weight, is 5 cents.	The same as for "printed matter," except that the lowest charge on any package, whatever its weight, is 2 cents.
West Coast—Native Possessions.							
ASIA: (*b*) (*d*)							
Afghanistan.							
China.							
Korea.	5.	2.	4.	8.	1.		
Sarawak.							
§Shanghai—U. S. Postal Agency at (*b*) (*d*).							
OCEANICA: (*b*) (*d*)							
Cook Islands (Raratonga.)							
Friendly [Tonga] Islands.							
Navigators Islands, or Samoa.							
Pitcairn Island.	5.	2.	4.	8.	1.		
Savage Islands.							
Society Islands.							
Other islands in the Southern Pacific Ocean.							

§ Shanghai. Articles of every kind and nature which are admitted to the United States domestic mails are admitted to the mails exchanged between the United States and the United States Postal Agency at Shanghai, China; subject, however, to the following rates of postage, which must be prepaid, in all cases, by means of United States postage stamps on all articles, except official correspondence in "penalty" envelopes.

First-class matter, 5 cents for each ½ ounce or fraction of ½ ounce;
Postal cards, single, 2 cents each; double, 4 cents each;
Second and third-class matter, and samples of merchandise not exceeding 8 ounces in weight, 1 cent for each two ounces or fraction of 2 ounces
Fourth-class matter, 1 cent for each ounce or fraction of an ounce:
Packages of third and fourth-class matter (except single volumes of printed books) must not exceed four pounds (4 lbs.) in weight.
Registration fee, 8 cents; no additional charge for return receipt.
Articles other than letters *in their usual and ordinary form* must not be closed against inspection, but must be so wrapped or inclosed that they may be readily and thoroughly examined by postmasters and customs officers.
Articles addressed for delivery at the following places in China, viz:

Cheefoo (Yentai)	Hankow	Kaiping,	Nanking,	Ourga,	Taku,	Wuchang,
Chin Kiang,	Hung Chow	Kalgan,	Newchwang,	Peking,	Tientsin,	Wuhn,
Chung King,	Ichang,	Kiukiang,	Ningpo,	Shanghai,	Wenchow,	Yentai (Cheefoo).

are transmissable in the mails for the U. S. Postal Agency at Shanghai; but at places other than Shanghai, additional charges for postage may be collected of the addressees upon the delivery of the articles.

PARCELS POST.

STATEMENT SHOWING THE COUNTRIES TO WHICH PARCELS MAY BE SENT; THE DIMENSIONS, WEIGHT AND RATES OF POSTAGE APPLICABLE TO PARCELS, AND THE EXCHANGE POST OFFICES WHICH DISPATCH AND RECEIVE PARCELS POST MAILS.

Names of Countries.	Allowable Weight of Parcels.				Postage.		Exchange Post Offices.	
	Greatest Length.	Greatest Length and Girth Combined.	Greatest Girth.	Greatest Weight—Pounds.	For a Parcel not exceeding 1 Pound.	For every additional Pound or fraction of a Pound.	United States.	Foreign.
Bahamas	3 feet 6 inches.	6 feet.	.....	11	12 cts.	12 cts.	New York.	Nassau.
Barbadoes	3 " 6 "	6 "	. ....	11	12 "	12 "	"	Bridgetown.
Colombia	2 "	.....	4 feet.	11	12 "	12 "	All offices authorized to exchange mails between the two countries.	
Costa Rica	2 "	.....	4 "	11	12 "	12 "		
The Danish West Indies	3 " 6 "	6 feet.	.. ...	11	12 "	12 "		
Hawaii	3 " 6 "	6 "	.....	11	12 "	12 "	San Francisco.	Honolulu.
Honduras (British)	3 " 6 "	6 "	.. ...	11	12 "	12 "	New Orleans.	Belize.
Honduras (Republic)	3 " 6 "	6 "	.....	11	12 "	12 "	New York, New Orleans and San Francisco.	
Jamaica (inc. Turks and Caicos Islands.)	3 " 6 "	6 "	.....	11	12 "	12 "	New York.	Kingston.
Leeward Islands	3 "	6 "	.....	11	12 "	12 "	"	St. John, Antigua.
Mexico	2 " 6 "	.....	4 feet.	11	12 "	12 "	All offices authorized to exchange mails between the two countries.	
Salvador	3 " 6 "	6 feet.	.....	11	12 "	12 "		
Guiana (British)	3 " 6 "	6	.....	11	12 "	12 "		
Windward Islands	3 " 6 "	6	.....	11	12 "	12 "		
Newfoundland	3 " 6 "	6 "	.....	11	12 "	12 "	New York, Philadelphia.	St. John's, N. F.

AMERICAN PHOTOGRAPHIC SOCIETIES.

NOTICE.—*The Editor will be pleased to receive particulars of other Photographic Societies not included in this list, in order to make it as complete as possible.*

ALBANY CAMERA CLUB.—72 Chapel Street, Albany, N. Y. Organized 1884. *President*, Chas. V. Winne; *Vice-President*, Robert Shaw Oliver; *Directors*, Samuel B. Ward, George H. Russell, L. H. Neuman, Howard P. Moore, C. W. Reynolds, Scott D. M. Goodwin, Chas. H. Moore, Augustus Pruyn; *Treasurer*, T. L. Carroll; *Librarian*, M. H. Rochester. *Secretary*, Chas. L. Palmer, 274 State Street. Place of meeting, 72 Chapel Street. Ordinary meetings, first Friday of each month. Special meetings, at call of President. Annual meeting, first Friday of April. Membership September 1: Honorary, 2; active, 55; associate, 43; total, 100. Exhibitions, lantern slide exhibitions are given frequently during winter months; a print exhibition is held each year.

AMATEUR PHOTOGRAPHIC ASSOCIATION.—Selma, Ala. Organized December 29, 1887. *President*, William S. Monk; *Vice-President*, S. A. Sexton; *Executive Committee*, Mary E. Keipp; *Treasurer-Secretary*, S. Orlando Trippe, Selma, Dallas Co., Ala. Place of meeting, 916 Broad Street. Ordinary meetings, first and third Friday in each month. Special meetings, at call of President. Annual meeting, first Friday in January. Membership September 1: Active, 28.

AMERICAN INSTITUTE (PHOTOGRAPHICAL SECTION).—19 and 21 West 44th Street, New York City. Organized 1859. *President*, Oscar G. Mason; *Vice-President*, Robt. A. B. Dayton; *Treasurer*, George H Toop; *Secretary*, J. W. Bartlett, M.D., 149 West 94th Street, New York City. Place of meeting, 19 and 21 West 44th Street. Ordinary meetings, first Tuesday in each month, at 8.30 P.M., except June, July, August, and September. Exhibitions, photographic salon regularly held each year.

AMERICAN LANTERN SLIDE INTERCHANGE.—Organized 1885. *President, General Manager*, F. C. Beach; *Board of Managers*, F. C. Beach, W. H. Cheney, W. H. Rau, George Timmins, John S. Paterson. Annual meeting, November 15th each year. Membership September 1, consisted of twenty-eight clubs and societies, as follows: Camera Club, of New York, Photographic Society of Philadelphia, Newark (N. J.) Camera Club, Orange Camera Club, Frankford (Pa.) Camera Club, Bethlehem Photographic Society, St. Louis Photographic Society, California Camera Club (San Francisco, Cal.), Oregon Camera Club (Portland, Ore.), Minneapolis Camera Club, Rockford (Ill.) Camera Club, Chicago Society of Amateur Photographers, Buffalo Camera Club, Syracuse Camera Club, Albany Camera Club, New Britain Camera Club, Toronto Camera Club, Montreal Camera Club, Hamilton Association Camera Club, Topeka Camera Club, Sacramento Camera Club, Redlands (Cal.) Camera Club, Rutland Camera Club, Colorado (Denver) Camera Club, Department of Photography (Brooklyn Institute), St. Catherine's Camera Club, Ottawa Camera Club, Lancaster (Pa.) Camera Club.

ATLANTIC CITY PHOTOGRAPHIC SOCIETY.—1,000 Atlantic Avenue, Atlantic City, N. J. Organized November 10, 1895. *President*, Herbert N. Morse; *Vice-President*, Fred. Stadler, Jr.; *Treasurer*, L. D. Algar; *Secretary*, Hubert Somers, 1816 Arctic Avenue; *Executive Committee*, Herbert N. Morse, Fred. Stadler, Jr., L. D. Algar, Hubert Somers, H. P. Miller, Miss Lou Ina Evans. Meetings on the first Monday of each month and special meetings at the call of the President. Annual meeting, the first Monday in February each year. Give three public slide exhibitions each year, three print contests for gold medals each year among the members, and numerous lectures on photographic work and slides for members. Membership September 1: Active, 58.

BETHLEHEM PHOTOGRAPHIC SOCIETY.—Bethlehem, Pa. Organized January, 1890. *President*, J. E. Tatnall; *Vice-President*, Prof. J. T. Hamilton; *Executive Committee*, President, Vice-President, Treasurer-Librarian, Secretary. *Treasurer-Librarian*, Eugene A. Rau; *Secretary*, R. P. Stout, 332 Market Street. Place of meeting, residences of members. Ordinary meetings, third Tuesday of each month, except July and August, at 8 P.M. Special meetings, at the call of the Executive Committee. Annual meeting, third Tuesday of September. Membership September 1: Honorary, 2; active, 18; corresponding 3; total, 23.

BOSTON CAMERA CLUB.—50 Bromfield Street, Boston, Mass. Organized 1881. *President*, Joseph Prince Loud; *Vice-Presidents*, William O. Witherell, Charles H. Currier, Charles Sprague; *Executive Committee*, officers and Thomas J. Babcock, Fred. S. Harlow, Frederick S. Anable, Edward R. Andrews, Francis H. Manning, William R. Richards; *Treasurer*, Charles H. Chandler; *Librarian*, G. Francis Toplift; *Secretary*, Chas. Hall Perry, 50 Bromfield Street. Place of meeting, Club rooms, 50 Bromfield Street. Ordinary meetings, first Monday in each month, except July, August, and September, at 8 P.M. Annual meeting, on the first Monday in January. Membership September 1: Honorary, 9; active, 96; associate, 8; total, 113. Exhibitions, annual exhibition in April; other exhibitions monthly.

BRIDGETON CAMERA SOCIETY.—Bridgeton, N. J. Organized 1888. *President*, F. F. Smith; *Vice-President*, S. H. Ogden; *Board of Managers*, Howard Fithian, Sydney Bowen, E. B. Garrison; *Treasurer*, H. L. Reeves; *Secretary*, C. C. Woodruff, Bridgeton, N. J.; *Corresponding Secretary*, Jas. Boyd Potter, Bridgeton, N. J. Place of meeting, Club rooms, 46 East Commerce Street. Ordinary meetings, first Tuesday of each month. Annual meeting, first Tuesday in February. Membership September 1: Active, 44.

BROOKLYN ACADEMY OF PHOTOGRAPHY.—177 Montague Street, Brooklyn, N.Y. Organized February, 1887. *President*, William Arnold; *1st Vice-President*, Dr. S. B. Price; *2d Vice-President*, Sherman Esselstyn; *Board of Trustees*, Wm. Arnold, Dr. S. B. Price, S. Esselstyn, Wm. T Wintringham, Wm. B Dudley, H. M. Valentine, W. C. Daggett, Frank La Manna, H. B. Fullerton, Dr. John Merritt, Aug. A. Gaubert, Samuel Baron. *Treasurer*, Wm T. Wintringham; *Librarian-Curator*, W. C. Daggett; *Corresponding Secretary*, Wm. B. Dudley; *Recording Secretary*, H. M. Valentine. Place of meeting, 177 Montague Street. Ordinary meetings, first Tuesday in each month. Special meetings, on call of chair, or on written request of five members. Annual meeting, first Tuesday in June. Membership September 1: Honorary 6; active, 68; corresponding, 15; total, 89. Exhibitions, competitive exhibition of prints and lantern slides every spring.

BUFFALO CAMERA CLUB.—The Palace Arcade Building, 617 Main Street, Buffalo, N. Y. Organized October 1, 1888. *President*, John A. Stein; *Vice-President*, Rev. C. E. Rhodes; *Board of Directors*, John A. Stein, Rev. C. E. Rhodes, Conrad L. Baer, Thad. W. Gardiner, John P. Zenner, Harlow H. Boyce, H. H. Guenther, H. W. Saunders, William G. Houck, Philip J. Knapp, George J. Bailey; *Treasurer*, Conrad L. Baer; *Exhibition Manager*, John P. Zenner; *Secretary*, Thad. W. Gardiner, 444 Herkimer Street, Buffalo, N. Y. Place of meeting, Palace Arcade Building. Ordinary meetings, Directors' meetings on fourth Friday of each month, at 8.15 P.M. Annual meeting, fourth Tuesday in September, at 8 15 P M. Membership September 1: Honorary, 3; active, 107; total, 110. Exhibitions, lantern slide exhibitions held fortnightly during winter season, at Club rooms; member American Lantern Slide Interchange.

CALIFORNIA CAMERA CLUB.—Academy of Sciences Building, San Francisco, Cal. Incorporated April 5, 1890. *President*, J. W. Erwin; *Vice-Presidents*, E. J. Dollard and W. B. Webster; *Board of Directors*, the Officers, and W. J. Street, J. J. B. Argenti, H. B. Madison, J. W. Finigan; *Treasurer*, E. G. Eisen; *Librarian*, M. A. Greenlaw; *Secretary*, H. B. Hosmer, 819 Market Street, Room 58, San Francisco, Cal.; *Corresponding Secretary*, Chas. A. Lee. Place of meeting, Club rooms, Academy of Sciences Building. Ordinary meetings, first Tuesday after first Monday in each month. Special meetings, at call of President or at written request of ten active members. Annual meeting, regular monthly meeting in April. Membership September 1: Honorary, 5; active, 247; subscribing, 109; associate, 9; total, 379. Exhibitions, monthly illustrated lectures; print exhibitions held annually.

"CAMERADS."—New Brunswick, N. J. *President*, Prof. P. T. Austen; *Secretary*, Dr. H. Iredell, Lock Box 34, New Brunswick, N. J. Place of meeting, Rutgers College.

CAPE ANN CAMERA CLUB.—Gloucester, Mass. Organized June 22, 1899. *President*, Robert Herne; *Vice-President*, Dr. Percy Proctor; *Executive Committee*, President, Vice-President, Treasurer, Secretaries, and F. A. Docherty, E. L. Munger, Geo. D. Winchester, David I. Robinson; *Treasurer*, Thos. H. Hunt; *Recording Secretary*, Mrs. E. S. Curtis, 227 Washington Street, Gloucester, Mass.; *Corresponding Secretary*, Herman W. Spooner, Gloucester, Mass. Place of meeting, 48 Main Street. Ordinary meetings, first and third Tuesdays of each month, at 8 P.M. Annual meeting, third Tuesday in June. Membership September 1: Active, 80.

CAPITOL CAMERA CLUB.—Washington, D. C. Organized May 1, 1891. *President*, George W. White; *Vice-President*, Wallace C. Babcock; *Board of Directors*, George W. White, Wallace C. Babcock, William P. Herbst, Charles E. Fairman, W. F. Peabody, Dr. Robert Reyburn, A. J. Le Breton, William D. Searle, E. M. Tolman, Rev. Leslie Moore, Rev. L. G. Wood, Miss Kate S. Curry; *Treasurer*, William P. Herbst; *Librarian*, W. F. Peabody; *Secretary*, Charles E. Fairman, 511 11th Street,

N. W. Place of meeting, Club rooms, 1010 F Street, N. W. Ordinary meetings, first Saturday in each month, at 8 P.M. Annual meeting, first Saturday in May. Membership September 1: Honorary, 7; active, 95; total, 102. Exhibitions, annual exhibition of prints in April.

CHICAGO CENTRAL Y. M. C. A. CAMERA CLUB.—153 La Salle Street, Chicago, Ill. Organized 1896. *President*, Dr. A. K. Crawford; *Vice-Presidents*, W. T. Hart. W. T. Galloway; *Treasurer*, Dr. G. G. Burdick; *Secretary*, F. C. Hersey, Jr., 153 La Salle Street, Chicago, Ill. Annual meeting, in March. Membership September 1: Active, 61. Exhibition, in fall. Lectures throughout the year.

CHICAGO SOCIETY OF AMATEUR PHOTOGRAPHERS.—An affiliated Society of the Art Institute of Chicago. Organized July 21, 1894: succeeding the Chicago Lantern Slide Club. *President*, T. Geo. Hislop; *Vice-President*, E. M. Murray; *Board of Directors*, Dr. Gordon G. Burdick, W. S. Besley, Frederick K. Lawrence, Marshal Wait, Chas. C. Cook; *Treasurer*, Geo. H. Kittoe; *Secretary*, Edward W. Grievish, The Art Institute, Chicago, Ill. Place of meeting, The Art Institute. Ordinary meetings, second and fourth Wednesday evenings of each month. Special meetings, all other Wednesday evenings, and work nights, Monday evenings. Annual meeting, fourth Wednesday in January. Membership September 1: Honorary 12, active, 140; total, 152. Exhibitions, dates not yet fixed; a salon to be held late in the winter is under consideration and several other print exhibits will be held.

COLORADO CAMERA CLUB ASSOCIATION, THE.—329 16th Street, Denver, Col. Organized 1892. *President*, Major William Cooke Daniels; *Vice-President*, S. Charlton McCurdy; *Board of Directors*, William Cooke Daniels, S. C. McCurdy, Geo. L. Beam, Alvin B. Daniels, Harry D. Smith, J. F. Ellsworth, S. B. Hord; *Treasurer*, Jesse F. Ellsworth; *Secretary*, Spencer B. Hord, 329 16th Street, Denver, Col. Place of meeting, 329 16th Street, Camera Club Building. Ordinary meetings, first Friday in each month. Special meetings, subject to call. Annual meeting; first Tuesday in December. Membership September 1: Honorary, 1; active, 124, total, 125. Exhibitions, in December of each year.

COLUMBIA PHOTOGRAPHIC SOCIETY OF PHILADELPHIA.—Organized December 7, 1889, Incorporated June 29, 1894. *President*, G. J. R. Miller, D.D.S. *1st Vice-President*, Percival A. Mitchell; *2d Vice-President*, Frank E. Gartley; *Board of Directors*, John S. Newman, Newton E. Roedel, Charles H. Smith, John Curtis, Jr., Frank V. Chambers, J. Harry Pepper, P. MacCaffrey, Louis Renner; *Treasurer*, John P. Kolb; *Secretary*, E. Ford Cuming, 1811 North Broad Street, Philadelphia, Pa. Place of meeting, 1811 North Broad Street. Ordinary meetings, first Monday evening of each month. Special meetings (Board), fourth Thursday of each month. Annual meeting, first Monday in February. Membership September 1: Honorary, 2; active, 135; corresponding, 7; total, 144. Publications, "The Camera," official organ of the Society.

COLUMBIAN AMATEUR PHOTO EXCHANGE.—Osage, Iowa. Organized 1893. *President*, A. H. Waite; *Secretary*, W. E. Dickinson, Osage, Iowa. Exchanges prints quarterly.

CORLISS ART AND CAMERA CLUB.—Corner of State and Harris Streets, Newburyport, Mass. Organized 1896. *President*, C. L. B. Anderson; *Vice-President*, Otis P. Gould; *Executive Committee*, J. H. Wheeler, C. L. B. Anderson, J. S. McDaid, Dr. H. C. Hovey, F. G. Nichlas, Charles A. Coburn, Charles K. Morrison, Adelaide H. Pritchard, Gertrude Lewis, Julia Hubbard. Sadie Morse, Charlotte Dickens; *Treasurer*, L. F. Noyes; *Secretary*, John H. Wheeler. Corliss Memorial Building, Newburyport, Mass; *Corresponding Secretary*, E. F. Noyes. Place of meeting, Corliss Memorial Building. Ordinary meetings, first Friday in each month. Special meetings, called by the President or by request of three members. Annual meeting, first Friday in April. Membership September 1: Honorary, 3; active, 47; total, 50. Exhibitions are held annually; the fourth exhibition will be held March 16-19, 1900.

CORTLAND CAMERA CLUB.—Cortland, N. Y. Organized 1896. *President*, Jno. W. Orr; *Vice-President*, C. C. Darby; *Treasurer-Secretary*, L. M. Alexander, Lock Box 213, Cortland, N. Y. Place of meeting, Y. M. C. A. Ordinary meetings, first Wednesday in each month, at 8 P M. Annual meeting, first Wednesday in November. Membership September 1: Active, 15.

DETROIT CAMERA CLUB.—Detroit, Mich. Organized February 11, 1897. *President*, E. Donald Roberts; *Vice-President*, E. W. Sprague; *Executive Committee*, W. C. Jupp, O'Brien Atkinson, F. B. Wood, Geo. O. Pratt A. D. Noble, Jr., D. D. Spellman, E. W. Sprague, S. D. Gutchess, E. D. Roberts, W. E. Winckler; *Secretary-Treasurer*, W. E. Winckler, 106 Miami Avenue, Detroit, Mich; *Librarian*, A. D. Noble, Jr. Place of meeting, 106 Miami Avenue. Ordinary meetings, every alternate Tuesday evening. Annual meeting, first Tuesday in June. Membership September 1: Honorary, 5; active, 88; total, 93. Exhibitions, Club exhibit in June; National exhibit in November.

ELIZABETH CAMERA CLUB.—96 Broad Street, Elizabeth, N. J. Organized May, 1893. *President*, H. O. Halsey; *Vice-President*. W. Chester Wells; *Executive Committee*, W. R. Bird, E. W. Smith, Dr. E. D. Frost, D. R. Blackford, J. G. Green, J. L. Scott, James H. Walker; *Treasurer*. W. R. Bird; *Secretary*, James H. Walker, 729 South Broad Street, Elizabeth, N. J. Place of meeting, 96 Broad Street. Ordinary meetings, first Saturday in each month. Special meetings, when called by the President, 8 P.M. Annual meeting, first Saturday in May. Membership September 1: Active, 24; corresponding, 2; total, 26.

HAVERHILL CAMERA CLUB.—Rear of Academy of Music, Haverhill, Mass. Organized February 8, 1898. *President*, Charles W. Glines; *Vice-President*, George E. Dodge; *Executive Committee*, Wm. E. Burke, E. H. Lutkin, and officers; *Treasurer*, Alfred E. Collins; *Secretary*, Alfred E. Collins, Haverhill Savings Bank, Haverhill, Mass. Place of meeting, rear of Academy of Music. Ordinary meetings, second Tuesday of each month, 8 P.M. Special meetings, may be called at any time by the President at the request of three members. Annual meeting, second Tuesday of June, 8 P.M. Membership September 1: Honorary, 2; active, 22; total, 24.

INTERNATIONAL PHOTO PRINT EXCHANGE.—Organized May, 1893. A postal Photograph Exchange Club, limited to twenty members. *Secretary*, Walter Sprange, Beach Bluff, Mass. No meetings. Membership September 1: Active, 20.

FRANKFORD CAMERA CLUB.—(Photographic Section, Wright's Industrial and Beneficial Institute, Frankford, Philadelphia, Pa.). Organized October 1888. *President*, B. Antrim Haldeman; *Vice-President*, Jno. B. Lomar; *Executive Committee*, B. S. Thorp, H. T. Crankshaw, Jno. B. Lomar, Miss M. C. Shallcross, Miss M. W. Rorer, and *ex-officio* the President and Secretary; *Treasurer*, Harry T. Crankshaw; *Secretary*, John M. Justice, 5016 Penn Street, Frankford, Philadelphia, Pa. Place of meeting, Club rooms, Wright's Institute. Franklin and Unity Streets. Regular meetings, second Friday in each month. Conversational meetings, fourth Friday in each month. Special meetings, at call of President. Annual meeting, second Friday in April. Membership September 1: Honorary, 2; active, 99; contributing, 3; corresponding, 6; total, 110. Exhibitions, annual, second Thursday in November; others as Executive Committee may arrange for.

LANCASTER CAMERA CLUB.—Lancaster, Pa. Organized May 15, 1895. *President*, W. S. Gleim; *Vice-President*, W. A. Heitshu; *House Committee*, P. H. Schaum, G. H. Werntz, W. A. Heitshu; *Treasurer-Secretary*, Chas. A. Sauber; *Librarian*, G. Howard Werntz; *Corresponding Secretary*, F. A. Demuth, 114 East King Street, Lancaster, Pa. Place of meeting, Morning News Building, Penn Square. Ordinary meetings, first and third Thursday of each month, 8 P.M. Special meetings, call of five members or the President. Annual meeting, first Thursday in May. Membership September 1: Honorary, 4; active, 21; total, 25. Exhibitions, annual lantern slide, March of each year; admission by invitation of member. Members American Lantern Slide Interchange.

LAWRENCE CAMERA CLUB.—Lawrence, Mass. Organized February 28, 1898. *President*, Lester Prescott; *Vice-President*, John H. Greer; *Directors*, Lester Prescott, John H. Greer, J. Rodney Ball, Elbert H. Dyer, Albert Morgan; *Treasurer*, Elbert H. Dyer; *Auditor*, Albert Morgan; *Secretary*, J. Rodney Ball, 232 Bruce Street, Lawrence, Mass. Place of meeting, Trinity Chapel, Lawrence. Ordinary meetings, second Monday in each month, at 7.45 P.M. Annual meeting, second Monday in March. Membership September 1: Active, 10.

LOWELL CAMERA CLUB.—Lowell, Mass. Organized 1889. Incorporated 1892. *President*, William P. Atwood; *Vice-President*. Frederick T. Walsh; *Executive Committee*, Charles Runels, Oliver H. Perry, Fay H. Martin; *Treasurer*, M. A. Taylor; *Librarian*, A. H. Sanborn; *Secretary*, George A. Nelson, 305 Sumner Street, Lowell, Mass. Place of meeting, Central Block. Ordinary meetings, at call of President. Special meetings, at call of President. Annual meeting, first Tuesday in March. Membership September 1: Active, 21.

MANHATTAN CHAPTER OF THE AGASSIZ ASSOCIATION, N. Y. B. 87.—141 East 40th Street, New York City. Organized May, 1881. *President*, R. P. Miller; *Vice President*, Catharine Hargrove; *Board of Trustees*, R. P. Miller, W. S. Miller, C. F. Groth, C. J. Miller, F. C. Fruhan; *Treasurer*, Wm. S. Miller; *Librarian*, Miss M. Grosskopf; *Secretary*, Christian F. Groth, 141 East 40th Street, New York City. Place of meeting, 141 East 40th Street. Ordinary meetings, first Friday after the first Monday of each month, except July and August. Special meetings, at call of President. Annual meeting, first meeting of January. Membership September 1: Active, 25.

MATTAPAN CAMERA CLUB.—Brush Hill Road, Mattapan, Mass. Organized May, 1890. *President*, John A. Locklin; *Vice-President*, Walter Hertzberg; *Treasurer*,

Walter Hertzberg; *Librarian-Secretary*, Erdmann Sonnenbrodt, Brush Hill Road, Mattapan, Mass. Place of meeting, Secretary's studio, Brush Hill Road. Ordinary and Special meetings, when and where designated at private residences of members. Annual meeting, May every year. Membership September 1: Active, 14.

MINNEAPOLIS CAMERA CLUB.—Club rooms, 309 Nicollet Avenue, Minneapolis, Minn. Organized 1892. *President*, H. E. Murdock; *Vice-President*, W. H. McMullen; *Board of Directors*, C. A. McCollom, M.D., Geo. W. Beach, A. S. Williams, E. J. Kimball, Oscar Tucker, L. J. Spinner; *Treasurer*, J F. Schlimme; *Secretary*, C. J. Hibbard, 309 Nicollet Avenue, Minneapolis, Minn. Place of meeting, 309 Nicollet Avenue. Annual meeting, April. Membership September 1: Honorary, 4; active, 96; associate, 50; total, 150.

MONTCLAIR CAMERA CLUB.—Montclair, N. J. Organized November 10, 1898. Incorporated August 5, 1899. *President*, J. Stewart Gibson; *Vice-President*, Dr. Henry C. Close; *Trustees*, composed of the officers and Chairman of the House Committee, E. N. Benham; Chairman of the Finance Committee, T. S. Doremus; Chairman of the Lantern Slide Committee, S. F. Taylor; Chairman of the Membership Committee, J. Hallock Waring; Chairman of the Library Committee, F. S. Gage; *Treasurer*, L. K. Mulford; *Secretary*, W. J. Dykes, 456 Bloomfield Avenue, Montclair, N. J. Place of meeting, 456 Bloomfield Avenue. Regular meetings, on the 10th and 25th of each month, except July and August. Annual meeting, on the 25th of February. Membership September 1; Honorary, 2; active, 50; associate, 5; total, 57.

MONTREAL CAMERA CLUB.—Club rooms, 4 Phillips Square, Montreal, Canada. Organized September, 1890. Incorporated May, 1893. *President*, Frank R. Redpath; *Vice-President*, George Sumner; *Executive Committee*, Alfred W. Cole, J. L. Kerr, Robt. Turnbull, W. A. Scott, W. T. Marlatt, R. Wilson, Jr.; *Secretary-Treasurer*, A. C. Lyman, 157 St. James Street, Montreal, Canada. Place of meeting, Club rooms, 4 Phillips Square. Ordinary meetings, every Tuesday from October till May, at 8 P.M. Annual meeting, first Tuesday in May, at 8 P.M. Membership September 1: Active, 95. Exhibitions, held annually.

MYSTIC CAMERA CLUB.—Medford, Mass. Organized June 4, 1889. *President*, Will C. Eddy; *Vice-President*, L. E. Shattuck; *Executive Committee*, Will C. Eddy, Geo. W. Prowse, Everett Scammon, L. E. Shattuck, Chas. A Clark, J. F. W. Ames; *Treasurer*, Chas. A. Clark; *Librarians*, Executive Committee; *Secretary*, Geo. W. Prowse, 20 Brookings Street, Medford, Mass. Place of meeting, 2 Ashland Street. Ordinary meetings, first and third Tuesdays in each month, 8.15 P.M. Special meetings, as called by Executive Committee Annual meeting, first Tuesday in January, 8.15 P.M. Membership September 1: Honorary, 5; active, 23; associate, 2; total, 30. Exhibitions, June 17th each year.

NEWARK (DEL.) CAMERA CLUB.—Newark, Del. Organized 1893. *President*, F. D. Chester; *Vice-President*, G. H. Powell; *Treasurer-Secretary*, F. W. Curtis, Newark, Del. Place of meeting, Club rooms. Annual meeting, May 1. Membership September 1: Active 10.

NORWALK CAMERA CLUB.—South Norwalk, Conn. Organized November, 1897. *President*, Mrs. V. D. Prentise Lingan; *Vice-President*, David Disbrow; *Secretary-Treasurer*, Harry H. Finch, 13 Clay Street, South Norwalk, Conn. Regular meetings, first Wednesday in the month. Special meetings, at call of President. Annual meeting, first Wednesday in November. Membership September 1: Active, 22.

OLD COLONY CAMERA CLUB.—Rockland, Mass. Organized February 1, 1890. *President*, David Smith; *Vice-President-Treasurer*, Emery H. Jenkins; *Secretary*, David Smith, Rockland, Mass. Place of meeting, Arnold Building. Ordinary meetings, at the call of the President. Membership September 1: Active, 12.

ONEIDA CAMERA CLUB.—Post Office Building, Oneida, N. Y. Organized March, 1884. *President*, Bradley Seymour Teale; *Vice-President*, George P. Hanson; *Executive Committee*, Jacob Standt, Wesley S. Fisher, Charles M. Kingsbury; *Treasurer*, Albert Dygert; *Secretary*, C. R. Baker, Post Office Building, Oneida, N. Y. Place of meeting, Club rooms, Post Office Building. Special meetings, at call of President. Annual meeting, first Tuesday in March. Membership September 1, Honorary, 2; active, 30; total, 32. Exhibitions, lantern slide exhibition in February.

ORANGE CAMERA CLUB.—Orange, N. J. Organized March 21, 1892. *President*, F. H. Gould; *Vice-President*, D. S. Plumb; *Executive Committee*, all Officers; *Treasurer*, E. S. Butterfield; *Library Committee*, Chairman, T. J. Preston, Jr.; *Secretary*, W. H. Mason, Decker Building, Orange, N. J. Place of meeting, Decker Building, Orange, N. J. Ordinary meetings, 5th and 20th of each month Special meetings, at call of President. Annual meeting, March 20th. Membership September 1: Honorary, 3; active, 100; total, 103. Active membership limited to 100. Exhibitions, about November 15th of each year, annual Lantern Slide and Print Exhibit.

OREGON CAMERA CLUB.—Portland, Ore. Organized January, 1895. *President*, Will H. Walker; *Vice-President*, J. W. Holmes; *Executive Committee*, Will H. Walker, J. W. Holmes, J. A. Hertzman, A. E. Morris, D. Ellery, Harry Smith, F. A. French, W. S. Macrum; *Treasurer*, F. A. French; *Secretary*, W. S. Macrum, Merchants' Bank, Portland, Ore. Place of meeting, Club rooms, Oregonian Building. Ordinary meetings, first Tuesday in each month. Annual meeting, first Tuesday in November. Membership September 1: Honorary, 6; active, 150; corresponding, 101; total, 157. Exhibitions, last two weeks of October in each year.

PHOTOGRAPHIC CLUB OF BALTIMORE CITY, THE.—Corner of Madison and Eutaw Streets, Baltimore, Md. Organized, 1886. *President*, Frank T. Slothower, M.D.; *Vice-President*, Percy Meredith Reese; *Directors*, Frank F. Slothower, M.D., Percy M. Reese, E. M. Barker, J. P. Bigham, Jordan Stobler, J. T. Norris, F. W. McAllister; *Treasurer*, Enoch M. Barker; *Secretary*, J. Plumer Bigham, 609 West North Avenue, Baltimore, Md. Place of meeting, Club house, corner of Madison and Eutaw Streets. Ordinary meetings, 8 to 12 P.M. every Tuesday in the year. Special meetings, business meetings held first Tuesday in each month, at 8 P.M. Annual meeting, first Tuesday in April. Membership September 1: Active, 100. Exhibitions, lantern slides once a month all winter.

PHOTOGRAPHIC SECTION OF THE HAMILTON ASSOCIATION.—Public Library Building, Hamilton, Ontario, Canada. *President*, J. M. Eastwood; *First Vice-President*, A. H. Baker; *Second Vice-President*, W. White; *Treasurer*, Geo. Lees; *Secretary*, W. H. Edwards, 168 Main Street, E., Hamilton, Ontario, Canada. Place of meeting, Hamilton Association Rooms, Public Library. Ordinary meetings, weekly throughout the winter. Regular business meeting, on the last Tuesday of the month, at 8 P.M. Annual meeting, last Tuesday in April. Membership September 1: Honorary, 1; active, 66; total, 67. Exhibitions, prints and lantern slides.

PHOTOGRAPHIC SOCIETY OF PHILADELPHIA.—10 South 18th Street, Philadelphia, Pa. Organized November, 1862. *President*, Robert S. Redfield; *Vice-Presidents*, George Vaux, Jr., Walter F. Stokes; *Board of Managers*, John C. Browne, John G. Bullock, Joseph H. Burroughs, Samuel Castner, Jr., F. William Geisse, William N. Jennings, Charles R. Pancoast, William H. Rau, William H. Roberts, Benjamin Sharp, M.D., Henry Troth, William S. Vaux, Jr; *Treasurer*, Anthony W. Robinson; *Secretary*, Edmund Stirling, 4517 Kingsessing Avenue (B), Philadelphia, Pa. Place of meeting, 10 South 18th Street. Ordinary meetings, second Wednesday of each month, except in July, August, and September. Special meetings, first and fourth Wednesdays of each month. Annual meeting, second Wednesday in April. Membership September 1: Honorary, 1; active, 238, corresponding, 15; total, 254. Publications, "Journal of the Photographic Society of Philadelphia." Exhibitions, Philadelphia Photographic Salon, October 11 to November 19, 1899, under joint management with the Pennsylvania Academy of the Fine Arts; also, members and "one man" exhibits monthly.

PITTSBURG AMATEUR PHOTOGRAPHERS' SOCIETY.—Carnegie Library, Pittsburg, Pa. Organized 1885. Incorporated 1896. *President*, E. E. Keller; *Vice-President*, H. L. Christy; *Board of Trustees*, E. E. Keller, H. L. Christy, W. J. Hunker, Mrs. S. A. Ammon, F. T. Aschman, J. H. Hunter, F. E. Gaither, A. B. McVay, W. J. Boston; *Treasurer*, W. J. Hunker; *Secretary*, Joseph H. Hunter, 520 Green Street, Pittsburg, Pa.; *Assistant Secretary*, Chas. C. McVay. Place of meeting, Carnegie Library. Ordinary meetings, second Monday of each month. Annual meeting, second Monday in January. Membership September 1: Honorary, 2; active, 98; total, 100. Publications, Annual Salon and Exhibition Catalogue. Exhibitions, Third Annual Salon and Exhibition will probably be held in March or April, 1900.

PITTSFIELD CAMERA CLUB.—Pittsfield, Mass. Organized February 1, 1892. *President*, J. F. Middleton; *Vice-President*, J. D. Roscoe; *Executive Committee*, J. F. Middleton, J. D. Roscoe, J. E. Colton, J. H. Musgrove, H. N. French, C. G. Tompkins, S. S. Stowell; *Treasurer*, J. H. Musgrove; *Secretary*, Jos. E. Colton, 768 North Street, Pittsfield, Mass. Place of meeting, 768 North Street. Ordinary meetings, second Wednesday of each month, at 8 P.M. Special meetings, called by the President. Annual meeting, second Wednesday in February. Membership September 1: Honorary, 1; active, 30; total, 31.

POSTAL PHOTOGRAPHIC CLUB.—Organized 1888. *President*, Albert J. L. Breton; *Secretary-Treasurer*, F. O. Congdon, 120 Broadway, New York City, N. Y. Membership September 1: Active, 40. Object—the circulation of an album monthly, made up of contributions by the members, together with a note-book for criticisms, etc.

PRATT INSTITUTE HIGH SCHOOL CAMERA CLUB.—Brooklyn, N. Y. Organized May 9, 1897. *President*, Irving Langmuir; *Vice-President-Secretary*, Robert L. Wood, Room 21, Pratt Institute, Brooklyn, N.Y.; *Treasurer*, H. P. Major; *Librarian*, W. B. Bowie. Place of meeting, Room 21, Pratt Institute. Regular meetings, monthly. Special meetings, upon call of President. Membership September 1: Active, 12. Exhibitions, annual, first week in June.

PROVIDENCE CAMERA CLUB.—174 Weybosset Street, Providence, R. I. Organized 1883. Incorporated 1889. *President*, Fred. P. Wilbur; *Vice-President*, W. Penn Mather; *Executive Committee*, F. P. Wilbur, A. F. Manchester, H. J. Reynolds, J. E. Davison, E. A. Darling, M. H. Bronsdon, S. B. Burnhame, F. E. Leonard, C. M. Lee, F. E. Brown, J. H Tucker, Mrs. E. E. Hill; *Treasurer*, Edmund A. Darling; *Recording Secretary*, Albert F. Manchester; *Corresponding Secretary*, Christopher M. Lee, 147 Elmwood Avenue, Providence, R. I. Place of meeting, at Club rooms, 174 Weybosset Street. Ordinary meetings, at call of President. Special meetings, at call of President. Annual meeting, second Wednesday in June. Membership September 1: Honorary, 1; active, 193; associate, 25; total, 219. Exhibitions, annual, in March or April.

ROSE TECH. CAMERA CLUB.—Terre Haute, Ind. Organized March 1, 1898. *President*, A. D. Kidder; *Vice-Presidents*, J. F. Schwed; *Executive Committee*, A. D. Kidder; J. F. Schwed, H. A. Schwartz, O. E. McMeans; *Treasurer-Secretary*, H. A. Schwartz, Rose Polytechnic Institute, Terre Haute, Ind. Place of meeting, room of Rose Polytechnic Institute, Y. M. C. A. Ordinary meetings, first Friday of each month, at 8 P.M., unless otherwise specified. Special meetings, at call of President. Membership September 1: Active, 10 Exhibitions of pictures submitted for prize competition held monthly. Annual exhibition also.

RUTLAND CAMERA CLUB.—Rutland, Vt. Organized October 20, 1893. *President*, Cornele G. Ross; *Executive Committee*, Cornele G. Ross, V. F. Worcester, N. S. Marshall; *Treasurer-Secretary*, V. F. Worcester, 149 South Main Street, Rutland, Vt. Place of meeting, houses of members. Ordinary meetings, second and fourth Tuesdays in each month, except July and August, at 8.45 P.M. Special meetings, at call of Executive Committee. Annual meeting, second Tuesday in October, at 8.45 P.M. Membership September 1: Associate, 2; active, 15; total, 17. Exhibitions, annual print, and lantern slide at irregular intervals.

SCHUYLKILL CAMERA CLUB.—Pottsville, Pa. Organized July 5, 1889. *President*, A. W. Sheafer; *Vice-President*, Miss Elena Roads; *Executive Committee*, A. W. Sheafer, Miss Elena Roads, W. L. Sheafer, B. S. Simonds; *Treasurer*, W. L. Sheafer. *Secretary*, B. S. Simonds, 1432 West Norwegian Street, Pottsville, Pa. Place of meeting, I. O. O. F. Hall, 107 Market Street. Ordinary meetings, last Friday of month. Special meetings, at call of President. Annual meeting, in May. Membership September 1: Honorary, 4; active, 37; corresponding, 48; total, 89. Exhibitions, at annual meeting and regular monthly meetings.

SPRINGFIELD CAMERA CLUB.—Rooms, corner of State and Dwight Streets, Springfield, Mass. Organized October, 1880. *President*, Bion D. Wheeler; *Executive Committee*, W. P. Draper, Bion W. Wheeler, E. L. Pease, J. W. Knight, John W. Roberts; *Librarian*, Fred. Huntley; *Secretary*, E. L. Pease, 71 James Street, Springfield, Mass. Place of meeting, rooms corner of State and Dwight Streets. Special meetings, at call of Executive Committee. Annual meetings, third Wednesday in October, at 8 P.M. Membership September 1: Honorary, 2; active, 64; total, 66.

ST. LOUIS PHOTOGRAPHIC SOCIETY.—901 Olive Street (temporary), St. Louis, Mo. *President*, R. E. M. Bain; *Vice-President*, John B. Holman; *Executive Committee*, R. E. M. Bain, D. B. Howard, C. M. Alexander, J. B. Holman; *Treasurer*, C. M. Alexander; *Librarian*, Mrs. Pingree; *Secretary*, C. M. Alexander. Place of meeting, not decided for the winter. Ordinary meetings, first Monday in each month. Special meetings, third Monday in each month. Annual meeting, first Monday in December. Membership September 1: Active, 32. Exhibitions, various times during the winter.

ST. PAUL CAMERA CLUB.—48 East 4th Street, St. Paul, Minn. Organized April 19, 1899. *President*, Wm. E. Johnson; *Vice-President*, W. J. Sonnen; *Trustees*, W. A. Gates, F. H. Lloyd, E. A. Drew, and the Officers; *Treasurer*, H. A. Clifford; *Librarian*, J. H. Hensel; *Secretary*, E. N. Easton, 48 East 4th Street, St. Paul, Minn. Place of meeting, third floor, 48 East 4th Street. Ordinary meetings, second Tuesday in each month, excepting July and August. Special meetings, subject to call. Annual meeting, second Tuesday in April. Membership September 1: Associate (ladies), 35; active, 81; total, 116.

SYRACUSE CAMERA CLUB.—Syracuse, N. Y. Organized 1886. *President*, H. B. Buell; *Vice-President*, J. I. H. Wright; *Board of Directors*, H. B. Buell, Dan. H. Sweet, F. L. Barnes, F. J. Schnauber, J. I. H. Wright, J. E. Bierhardt, H. F. Smith, Fred W. Field; *Treasurer*, J. E. Bierhardt; *Secretary*, Dan. H. Sweet, 246 West Railroad Street, Syracuse, N. Y. Place of meeting, 302-312 University Block. Ordinary meetings, Friday evening of each week, 8 P.M. Special meetings, by call of President. Annual meeting, first Friday in January. Membership September 1: Honorary, 2; active, 100; associate, 11; total, 113. Exhibitions, annual lantern slide exhibition of work of members; annual print exhibition of work of members.

TACOMA CAMERA CLUB.—415 Chamber of Commerce Building, Tacoma, Wash. *President*, Arthur G. Prichard; *Vice-President*, Mrs. John H. Scott; *Secretary*, Mrs. M. W. Graff, 415 Chamber of Commerce Building, Tacoma, Wash.; *Treasurer*, Frank G. Taylor.

THE CAMERA CLUB.—3 West 29th Street, New York City. Incorporated May 7, 1896. *President*, Wm. D. Murphy; *Vice-President*, Alfred Stieglitz; *Board of Trustees*, ten Trustees; *Treasurer*, Wm. E Wilmerding; *Librarian*, John Beeby; *Secretary*, Harry B. Reed, 3 West 29th Street, New York City. Place of meeting, 3 West 29th Street. Ordinary meetings, second Tuesday of each month, excepting July and August. Special meetings, when called. Annual meeting, second Tuesday of April. Membership September 1: Honorary, 17; active, 227; associate, 82; corresponding, 12; total, 338. Publications, "Camera Notes," quarterly, $2.50 per year. Exhibitions, monthly exhibitions of individual prints and members' prints in May and June; weekly lantern slide tests and bi-monthly lantern slide exhibitions and lectures.

TOPEKA CAMERA CLUB.—Topeka, Kans. Organized September 5, 1894. *President*, F. M. Tuckerman; *Vice-President*, R. H. Gaw; *Treasurer*, W. E. Culver; *Secretary*, F. M. Tuckerman. Place of meeting, members' homes. Ordinary meetings, second and fourth Tuesdays of each month. Annual meeting, second Tuesday in January. Membership September 1: Honorary, 6; active, 20; corresponding, 1: total, 27. Exhibitions, annual print exhibit.

TORONTO CAMERA CLUB —Forum Building, Yonge Street, Toronto, Ont. Organized 1886. *President*, Edmund E. King, M.D ; *1st Vice-President*, W. H. Moss; *2d Vice-President*, H. M. R. Glover; *Executive Committee*, J. G. Ramsey, H. Hampshire, W. McTaggart, W. Bohne, G. R. Baker, H. B. Leiroy; *Lantern Operator*, F. H. Middleton; *Treasurer-Secretary*, John J. Woolnough, 94 McPherson Avenue, Toronto, Ont.. Place of meeting, Forum Building, Yonge Street. Ordinary meetings, every Monday evening, from October to May. Special meetings, when called. Annual meeting, first Monday in November. Membership September 1: Honorary, 5; active, 175; non-resident, 8; total, 188. Exhibitions, early in December; open classes.

TRENTON PHOTOGRAPHIC SOCIETY.—Room 11, Scott Building, 132 East State Street, Trenton, N. J. Organized January, 1898. *President*, Wm. C. Lawrence; *Vice President*, Harry G. Aitken; *Board of Trustees*, consisting of the officers and three members; *Treasurer*, Harry V. Holden; *Secretary*, Grant Castner, 51 Bayard Street, Trenton, N. J. Place of meeting, Room 11, Scott Building, 132 East State Street. Ordinary meetings, second Monday evening in each month. Special meetings, at call of President. Annual meeting, first Monday evening in February. Membership September 1: Active, 26. Exhibitions, for prints, first week in January, 1900; lantern slide exhibitions during winter.

VALLEY CAMERA CLUB.—Phenix, R. I. Organized November 18, 1896. *President*, Ward E. Smith; *Executive Committee*, Ward E. Smith, F. J. Hoxie, Chas. T. Howard; *Treasurer*, F. J. Hoxie; *Librarian*, J. Bancroft Lawton; *Secretary*, J. Bancroft Lawton, Phenix, R. I. Place of meeting, Phenix, R. I. Ordinary meetings, second Wednesday of each month, 8 P.M. Annual meeting, first Monday of April, 8 P.M. Membership September 1: Active, 45. Exhibitions, regularly held in June and November.

WALLINGFORD CAMERA CLUB.—Wallingford, Conn. *President*, Lothar Caron von Grave; *Vice-President*, H. H. Hawkins; *Treasurer*, Prof. Franz Milcke; *Secretary*, F. L. Lathrop, Wallingford, Conn. Annual meeting, December.

YOUNG WOMEN'S CAMERA CLUB.—Minneapolis, Minn. Organized November, 1894. *President*, Miss Mabel Jameson ; *Vice-President*, Miss M. Belle Jeffery; *Executive Committee*, Miss Mabel Jameson, Miss M. Belle Jeffery, Miss Minerva Turnbull, Miss M Eva McIntyre; *Treasurer*, Miss Minerva Turnbull; *Secretary*, Miss M. Eva McIntyre, 1833 Portland Avenue, Minneapolis, Minn. Place of meeting, rooms of Young Women's Christian Association. Ordinary meetings, first Wednesday of each month. Special meetings, outings during the summer months, when prizes are offered. Annual meeting, in September. Membership September 1: Active, 55.

FOREIGN PHOTOGRAPHIC SOCIETIES.

GREAT BRITAIN AND IRELAND

ABERDEEN.—Aberdeen Photographic Association, 77 George Street. Secretary, A. Pender, 37 Belmont Street.

ACCRINGTON.—Accrington and District Camera Club, Mechanics' Institution. Secretary, I. Hanson, 341 Willows Lane.

AINTREE.—Aintree Photographic Society, Aintree Institute. Secretary, J. H. Rigby, Elton.

AIRDRIE.—The Monklands Photographic Society, Library Buildings. Secretary, W. Dixon Gray, Stanfield, Grahamshill.

ARBROATH.—Arbroath Amateur Photographic Association, Y. M. C. A. Rooms. Secretary, J. Hood, 94 High Street.

ASHTON-UNDER-LYNE.—Ashton-under-Lyne Photographic Society, Henry Square. Secretary, R. T. Marsland, 24 Park Parade.

BANBURY.—Banbury and District Photographic Society, Municipal Technical Schools. Secretary, S. H. Beale, Municipal Technical Schools.

BARNSLEY.—Barnsley and District Photographic Society, Arcade Hall, Market Hill. Secretary, A. Waterhouse, 46 Dodworth Road.

BARROW-IN-FURNESS. Barrow Naturalists' Field Club (Photographic Section), Cambridge Hall. Secretary, W. J. Angus, 79 Greengate Street.

BATH.—Bath Photographic Society, Royal Literary and Scientific Institution, Terrace Walk. Secretary, W. M. Ashman, 12A Old Bond Street.

BATLEY, W. YORKS.—Batley and District Photographic Society, Technical Schools. Secretary, W. H. Atkinson, Cemetery Lodge.

BELFAST.—Windsor Amateur Research Camera Club, Montpelier House. Secretary, W. J. Gibson, Montpelier House.

BELFAST.—City of Belfast Y. M. C. A. Camera Club, Wellington Chambers, Y. M. C. A., Wellington Place. Secretaries, J. McCleery and H. Rew, Y. M. C. A., 14 Wellington Place.

BELFAST.—Ulster Amateur Photographic Society, The Museum, College Square North. Secretary, J. Campbell Carson, 8 Wellington Place.

BEVERLEY.—Beverley Photographic Society, Butcher Row. Secretary, T. J. Morley, Toll Gravel.

BIRMINGHAM.—Aston Photographic Society, Burlington Hall, High Street, Aston. Secretary, T. A. Sands, May Villa, Ettington Road, Aston.

BIRMINGHAM.—Midland Camera Club. Secretary, H. Cooper, 19 Bearwood Road, Smethwick.

BIRMINGHAM.—Birmingham Photographic Society, Athletic Institute, John Bright Street. Secretary, C. J. Fowler, F.R.P.S., Court Mount, Erdington.

BIRMINGHAM.—Natural History and Philosophical Society, Norwich Union Chambers. Secretary, W. P. Marshall, M.I.C.E., and P. L. Gray, B.Sc.

BIRMINGHAM.—Photographic Survey of Warwickshire, Birmingham. Secretaries, J. H. Pickard, Priory Road, Edgbaston, and C. J. Fowler, Court Mount, Erdington.

BLACKPOOL.—Fylde Amateur Photographic Society, Blackpool. Secretary, J. Smith, 58 Withnell Road, South Shore.

BLAIRGOWRIE.—Blairgowrie and District Photographic Association, George Street. Secretary, H. B. Jamieson, 3 Allan Street.

BOLTON.—Bolton Mutual Photographic Society, County Borough of Bolton Technical Schools. Secretary, A. W. Roscoe, 141 Dean Church Lane.

BOOTLE.—Bootle Photographic Society, 188 Strand Road. Secretary, T. A. Dodd, 84 Queen's Road.

BRADFORD.—Bradford Camera Club, Central Coffee Tavern, Kirkgate. Secretary, W. Barker, Moody Street.

BRADFORD.—The Bradford Photographic Society, Grammar School, Cheapside. Secretary, E. Clough, 13 Chesham Street.

BRECHIN.—Brechin Photographic Association, Y. M. C. A. Institute. Secretary, A. Watson, 75 River Street.

BRIERLEY HILL.—Brierly Hill and District Camera Club, Moor Street Board Schools. Secretary, I. Thomas, Holly Hall, near Dudley.

BRIGHOUSE.—Brighouse Photographic Society, Town Hall. Secretary, J. H. Georgeson, 8 Henry Street.

BRISTOL.—Bristol and West of England Amateur Society, Literary and Philosophic Club, Berkeley Square. Secretaries, Edward Brightman, Lyndale, Redland Road, and Martyn Lavington, The Avenue, Redland Road.

BROMLEY.—Bromley Camera Club, School of Science and Art. Secretary, E. T. Godward, 5 College Slip.

BURNLEY.—Burnley Camera Club, Mechanics' Institution. Secretary, P. Brotherton, 19 Ormerod Road (or *Express* Office).

BURY.—Bury Photographic and Arts Club, 14 Market Street. Secretary, A. E. Riding. 96 Victoria Terrace, Tottington Road.

CARDIFF.—Cardiff Photographic Society, 7 and 8 Working Street. Secretary, L. E. Hopkins, 189 Castle.

CARLISLE.—Carlisle and County Amateur Photographic Society, Corporation Art Gallery, Tullie House. Secretary, S. W. B. Jack, 7 Petteril Bridge Terrace.

CHELTENHAM.—Cheltenham Amateur Photographic Society, College Pharmacy. Secretary, P. Thomas, College Pharmacy.

CHESTER.—Chester Society of Natural Science and Literature (Photographic Section), Grosvenor Museum. Secretary, J. H. Spencer, 36 Bridge Street.

CHICHESTER.—Chichester Photographic Society, St. Martin's Hall. Secretary, G. M. Turnbull, South Street.

CHORLEY.—Chorley Photographic and Sketching Club, West Street. Secretary, H. R. Dorning, M P.S., 8 Pall Mall.

CLECKHEATON.—Cleckheaton Mechanics' Institute Photographic Society, Technical School. Secretary, W. Drake, 7 Westgate.

COLNE.—Colne Camera Club, Cloth Hall. Secretary, R. T. Lawson, 34 Skipton Road.

COVENTRY.—Coventry and Midland. Secretaries, F. W. Bell and H. D. Waters, Club Rooms, 7 Little Park Street.

CROYDON.—Croydon Camera Club. Secretary, W. H. Rogers, 106 Holmesdale Road, South Norwood.

CROYDON.—Croydon Microscopical and Natural History Club (Photographic Section), Public Hall, George Street. Secretary, E. Pierce, 26 Balfour Road, South Norwood S. E.

DARWEN.—Darwen Photographic Association, Belgrave School. Secretary, Joseph Thomas, Greenleach Cottage.

DERBY.—Derby Photographic Society, Y. M. C. A. Institute, St. Peter's Churchyard. Secretary, A. Victor Haslam, Breadsall Priory.

DEVONPORT.—Devonport Camera Club, Technical School. Secretary, W. H. Lamb, 7 Chapel Street.

DONCASTER.—Doncaster Scientific Society, Free Library. Secretary, H. H. Corbett, 9 Priory Place.

DORCHESTER.—Dorset Amateur Photographie Association. Secretary, Rev. T. Perkins, Turnworth Rectory, Blandford.

DUBLIN.—City of Dublin Y. M. C. A. Camera Club, 43 Upper Sackville Street. Secretary G. M. Roche, 12 Montpelier Hill.

DUBLIN. Photographic Socicty of Ireland, 35 Dawson Street. Secretary, W. F. Cooper, 194 Clonliffe Road.

DUKINFIELD.—Dukinfield Photographic Society, Coöperative Hall. Secretary, D. Firth Hall Green.

DUNDEE.—Dundee Advertiser Photographic Club, *Dundee Advertiser* Office). Secretary A. Campbell, 4 Stewart Terrace, Barnhill (by Broughty Ferry), N. B.

DUNDEE.—Dundee and East of Scotland Photo Association, 39 High Street. Secretary, V. C. Baird, Broughty Ferry, N. B.

DUNSTABLE.—Dunstable Photographic Society, The Institute. Secretary, E. Hare, The Poplars.

DURHAM.—Durham City Camera Club, Shakespeare Hall. Secretary, R. Hauxwell, The Avenue.

EALING.—Ealing Photographic Society, Public Buildings. Secretary, R. M. Dawson, Holmrook, Jordan Road.

EASTBOURNE.—Eastbourne Photographic Society, Lismore Road. Secretary, J. J. Hollway, 11 Hyde Gardens.

EDINBURGH.—Edinburgh Photographic Club, 38 Castle Street. Secretary, T. Barclay, 180 Dalkeith Road.

EDINBURGH.—Edinburgh Photographic Society, 33 Castle Street. Secretary, J. S. McCulloch, W.S., 10A George Street.

EVERTON.—Everton Camera Club. Secretary, W. Tansley, 14 Wentworth Street.

EXETER.—Exeter Camera Club, Barnfield House. Secretary, C. R. M. Clapp, Barnfield House.

FAKENHAM.—Fakenham District Camera Club, Lancaster Temperance Hotel. Secretary, Henry Newson, The Square.

FALKIRK.—Falkirk Amateur Photographic Association, Newmarket Street. Secretary, W. Hamilton, Laurieston.

FALMOUTH.—Royal Cornwall Polytechnic Society, Polytechnic Hall. Secretary, E. Kitto, The Observatory.

FARNHAM, SURREY.—Farnham and District Photographic Society, Farnham Institute, South Street. Secretary, G. A. Hale, 36 Castle Street.

FAVERSHAM.—Faversham Photographic Society, Faversham Institute. Secretary, M. Laxon, 14 Market Place.

GAINSBOROUGH.—Gainsborough and District Camera Club, Britannia Works Committee Room. Secretary, R. C. Puckering, Clinton House.

GLASGOW.—Evening Times Camera Club, 46 Gordon Street. Secretaries, A. H. Duncan and J. H. A. McIntyre, M.I.M.E., 46 Gordon Street.

GLASGOW.—Glasgow and West of Scotland Amateur Photographic Association, 180 West Regent Street. Secretary, W. Goodwin, 3 Lynedoch Street.

GLASGOW.—Glasgow Photographic Association, Philosophical Society's Rooms, 207 Bath Street. Secretary, C. Macdonald, 100 West Regent Street.

GLENALMOND.—Glenalmond Photographic Club, Trinity College. Secretary, T. J. N. Bell, Trinity College.

GLOSSOP.—Glossop Dale Photographic Society. Secretary, T. W. Sharpe, 1 Pikes Lane.

GLOUCESTER.—Gloucestershire Photographic Society, Guildhall. Secretary, E. A. Ind, 36 Northgate.

GRAVESEND.—Gravesend Photographic Society, Medical Rooms. Secretary, T. L. Winnett, 5 The Grove.

GREENOCK.—Greenock Camera Club. Secretary, W. D. Boyd, 37 Hamilton Street.

GRIMSBY.—Grimsby and District Photographic Society, 81 Victoria Street. Secretary, A. E. Matthews, 59 Ainslie Street.

GREAT YARMOUTH.—Great Yarmouth Camera Club, The Tower, Gorleston. Secretary, H. Harvey George, The Tower, Gorleston.

GREAT YARMOUTH.—Great Yarmouth Wheelers and Cromwell Photo Club, Cromwell Hotel. Secretary, V. A. Norman, Dene Side.

GUILDFORD.—Guildford Photographic Society, 36 High Street. Secretary, A. E. Moon, 36 High Street.

HALIFAX.—Halifax Camera Club, 29 Northgate. Secretary, J. W. Holland, 17 Glen Terrace, Clover Hill.

HALTWHISTLE.—Haltwhistle and District Photographic Society, Market Place. Secretary, D. Macadam, London City and Midland Bank.

HAMILTON.—Hamilton Photographic Association, Castle Street. Secretary, G. L. Brown, Commercial Buildings.

HANDSWORTH.—Handsworth Photographic Society, College House, Hamstead Road. Secretary, A. E. Teague, 51 Sinwood Road.

HARROGATE.—Harrogate Field Naturalists' and Camera Club. Secretaries, J. Farrah, F.L.S., F.R. Met. S., and A. Lambert, St. George Street.

HASTINGS.—Hastings and St. Leonards Photographic Society. Secretary, C. W. Kennaway, Electricity Works.

HEREFORD.—Herefordshire Photographic Society, Clarence House, West Street. Secretary, C. Gethen, 9 St. Nicholas Street.

HIGH WYCOMBE.—Wycombe Camera Club, South Bucks Auction Mart. Secretary, J. Wilford, 7 High Street.

HOLMFIRTH.—Holmfirth Amateur Photographic Society. Secretary, D. Bilson.

HOVE.—Hove Camera Club, Hove Town Hall.

HULL.—Hull Photographic Society, 71 Prospect Street. Secretary, T. J. Hards, 305 South Boulevard.

HUDDERSFIELD.—Huddersfield Naturalist and Photographic Society, Y. M. C. A. Lecture Room, King Street. Secretary, A. Clarke, 9 St. Andrew's Road.

HYDE.—Hyde Amateur Photographic Society, 4 Reynard Street. Secretary, T. Hadfield, 99 Dukinfield Road.

KEIGHLEY.—Keighley and District Photographic Association, Mechanics' Institute, North Street. Secretaries, W. H. Hainsworth, Mount Pleasant, Cononley, and C. H. Smith, Devonshire Street.

KILMARNOCK.—Kilmarnock and Ayrshire Photographic Society, Kilmarnock. Secretary, T. H. Milloy, 15 William Street.

KINGSTON-ON-THAMES.—Kingston-on-Thames and District Photographic Society, Sun Hotel. Secretaries, J. F. East, Uxbridge House, Surbiton, and A. E. Smith, 6 Beaufort Villas, Beaufort Road.

KING'S LYNN.—King's Lynn Photographic Society, St. James's Rooms. Secretary, W. E. Daw, Church Street.

KING'S LYNN.—King's Lynn Y. M. C. A. Photographic Club, Y. M. C. A. Rooms, St. James Street. Secretary, F. Hampton, Y. M. C. A. Rooms, St. James's Street.

LANCASTER.—Lancaster Photographic Society, Stonewell. Secretary, W. Briggs, 21 Cheapside.

LEAMINGTON.—Leamington Amateur Photographic Society, Pump Room. Secretary, Signor Aspa, Priory House.

LEEDS.—Leeds Camera Club, Grand Restaurant, Boar Lane. Secretary, J. H. Gash, 115 Albion Street.

LEICESTER.—Leicester and Leicestershire Photographic Society, Sunday School Memorial Hall, New Walk. Secretary, Thomas Brown, 68 Church Gate.

LEIGH.—Leigh Photographic Society, Leigh Grammar School. Secretary, W. R. Moore, 20 Wilkinson Street.

LEITH.—Leith Amateur Photographic Association. Secretary, Alex. Pitkethly, 8 Wilkie Place.

LEWES.—Lewes Photographic Society, Town Hall. Secretary, G. Carpenter, 81 High Street.

LINCOLN.—Lincolnshire Science Society (formerly Lincoln Camera Club). Secretary, G. A. Grierson, 312 High Street.

LIVERPOOL.—Liverpool Amateur Photographic Association, Percy Buildings, Eberle Street. Secretary, F. A. Schierwater, Percy Buildings, Eberle Street.

LIVERPOOL.—University College Chemical Society (Photographic Section), University College. Secretary, W. A. Whetton, University College.

LIVERPOOL.—Liverpool Central Y. M. C. A. Camera Club, Mount Pleasant. Secretary, R. A. Croston, 44 Osborne Road, Tuebrook.

LIVERPOOL.—Walton Photographic Society, Walton Church Schools. Secretary, T. Bickerstaff, 79 Rawcliffe Road, Walton.

LIVERPOOL.—St. Michael's Junior Photographic Society, Church Rooms, Belgrave Road. Secretary, H. Goldstone, 66 Alwyn Street, St. Michael's.

LLANDUDNO.—Llandudno Camera Club and Lantern Society, Bodhyfryd Road. Secretary, A. E. Deacon, Bodhyfryd Road.

LONDON, E. C.—Photographic Club, Anderton's Hotel, Fleet Street. Secretary, W. Stretton, 4 Queen Street Place, E. C.

LONDON, E. C.—London and Provincial Photographic Association, White Swan Hotel, Tudor Street, Whitefriars. Secretary, T. E. Freshwater, 45 Torriano Avenue, N. W.

LONDON, E. C.—St. Bartholomew's Photographic Society, St. Bartholomew's Hospital. Secretary, R. T. Cooke, St. Bartholomew's Hospital, Smithfield, E. C.

LONDON, E. C.—Technical College, Finsbury, Photographic Society, Technical College, Finsbury. Secretary, G. S. Paxton, 74 George Street, Croydon, Surrey.

LONDON, N.—Barnet and District Photographic Society, Silesia College, High Barnet. Secretary, R. M. Gilbert, Silesia College, High Barnet, N.

LONDON, N.—North Middlesex Photographic Society, Jubilee House, Hornsey Road, N. Secretary, H. Stuart, 40 Lambton Road, Hornsey Road, N.

LONDON, N. E.—Hackney Photographic Society, Pembury Hotel, Amhurst Road. Secretary, W. Selfe, 70 Paragon Road, Hackney.

LONDON, N. E.—Photographic Convention of the United Kingdom. Secretary, F. A. Bridge, East Lodge, Dalton Lane, N. E.

LONDON, N. W.—Aldenham Institute Camera Club, Goldington Crescent, Pancras Road. Secretary, E. Bowen, Aldenham Institute, Goldington Crescent, S. W.

LONDON, N. W.—Gospel Oak Photographic Society, Congregational Schools, Lismore Road, Gospel Oak. Secretary, W. A. Palmer, 13 Dale Road, Kentish Town, N. W.

LONDON, S. E.—Borough Polytechnic Photographic Society, Borough Polytechnic Institute, 103 Borough Road, S. E. Secretary, P. C. Cornford, 103 Borough Road, S. E.

LONDON, S. E.—Goldsmith's Institute Camera Club, Goldsmith's Institute, New Cross, S. E. Secretaries, C. B. Storey and A. H. Downey, Goldsmith's Institute, New Cross, S. E.

LONDON, S. E.—Lewisham Camera Club, Rooms at Congregational Church, Lewisham High Road. Secretary, E. Eastwood, 47 Tressillian Road, Brockley, S. E.

LONDON, S. E.—Plumstead (All Saints') Photographic Society, Herbert Road Mission Hall. Secretary, G. V. Taylor, 29 Vernham Road, Plumstead, S. E.

LONDON, S. E.—South London Photographic Society, Hanover Hall, Hanover Park, Peckham. Secretary, F. Goddard, Woodlands, Vanbrugh Hill, Blackheath.

LONDON, S. W.—Amateur Photographic Field Club.—Secretary, Viscount Maitland, 14 Lower Sloane Street, S. W.

LONDON, S. W.—Brixton and Clapham Camera Club, Brixton Hall, Acre Lane. Secretary, A. Whittaker, "Birchwood," Norwood Road, Herne Hill, S. E.

LONDON, S. W.—Tooting Camera Club, Tooting Conservative and Unionist Club, Mitcham Road. Secretary, S. S. Hatfield, 4 Charlmont Road, Tooting.

LONDON, S. W.—West Surrey Photographic Society, Railway Hotel, Battersea Rise, Clapham Junction, S. W. Secretary, W. H. Wilshere, 236 Lavender Hill, Clapham Junction, S. W.

LONDON, W.—Architectural Association Camera Club, 56 Great Marlborough Street. Secretary, C. H. Freeman, 42 Howard Road, Cricklewood, N. W.

LONDON, W.—British Association for the Advancement of Science, Burlington House. Secretary, G. Griffith, M.A., Burlington House, W.

LONDON, W.—National Photographic Record Association, 66 Russell Square, W. C. Secretary, G. Scamell, 21 Avenue Road, Highgate, N.

LONDON, W.—Polytechnic Photographic Society, 309 Regent Street. Secretary, F. W. Parker, 76 Patshull Road, Camden Road, N. W.

LONDON, W.—Röntgen Society, 11 Chandos Street, Cavendish Square, W. Secretary, F. H. Low.

LONDON, W.—Royal Photographic Society. Secretaries, Col. J. Waterhouse, I.S.C., Oak Lodge, Court Road, Eltham, Kent, and A. W. W. Bartlett, 66 Russell Square, W.

LONDON, W.—West London Photographic Society, Broadway Lecture Hall, Hammersmith. Secretary, J. Brown, 28 Weltje Road, Hammersmith, W.

LONDON, W. C.—Camera Club, 28 Charing Cross Road. Secretary, F. S. Scott, Camera Club, Charing Cross Road, W. C.

LONDON, W. C.—Exeter Hall Photographic Society, Exeter Hall, Strand. Secretary, J. W. Hobday, Exeter Hall, Strand, W. C.

LONGTON, STAFFS.—Longton and District Photographic Society, Technical Institute, Stone Road. Secretary, T. Mottershead, 43 Stafford Street.

LOUGHBOROUGH.—Loughborough Amateur Photographic Society, Devonshire Square Dye Works. Seeretaries, P. Crane, 105 Toothill Road, and W. Clarke, the Gables.

LOUTH, LINCS.—Louth and District Photographic Society. Secretary, Rev. J. E. Standen, South Street.

LUDLOW.—Ludlow Photographic Society, Butter Cross. Secretary, J. H. Williams, 14 Mill Street.

LYONSDOWN, NEW BARNET.—Lyonsdown Amateur Photographic Society, members' houses. Secretary, W. Crosbie, the Chestnuts.

MANCHESTER.—Manchester Amateur Photographic Society, Manchester Athenæum, and 15 Brazenose Street. Secretary, F. W. Parrott, 3 Elm Road, Altrincham.

MANCHESTER.—Manchester Camera Club. Secretary, C. Dawson, 10 Chepstow Street, Oxford Street.

MANCHESTER.—Manchester Photographic Society, Manchester Chamber of Commerce Rooms, 44 Mosley Street. Secretary, C. H. Coote, 10 Holmefield, Sale.

MANCHESTER.—Openshaw, Fairfield, Gorton, and District Photographic Society, 528 Ashton Old Road, Openshaw. Secretaries, J. Tilley, 528 and 609 Ashton Old Road, Openshaw, and J. H. Bagley, Clowes Street, Gorton.

MANCHESTER.—The Stereoscopic Club, Brooklands. Secretary, W. I. Chadwick, 26 King Street.

MANCHESTER.—Manchester Y. M. C. A. Photographic Club, Y. M. C. A. Buildings, 56 Peter Street, City. Secretary, J. W. Price, 56 Peter Street.

MARGATE.—Margate Cycling and Camera Club, Munn's Rooms. Secretary, A. H. Markey, 8 Queen Street.

MIDDLESBROUGH.—Cleveland Camera Club, Literary and Philosophical Institution, Corporation Road. Secretary, F. W. Pearson, 98 Victoria Road.

NEWCASTLE-ON-TYNE.—Newcastle and Northern Counties Photographic Association, Building Trades Exchange, Art Gallery, Grainger Street. Secretaries, W. Thompson, 22 Campbell Street, and W. Parker Brewis, 32 Osborne Road.

NEWCASTLE-ON-TYNE.—Tyneside Camera Club, 145 Maria Street, Elswick. Secretary, J. F. McKie, 145 Maria Street, Elswick.

NEWTON HEATH.—Newton Heath Camera Club, Newton Heath Wesleyan School. Secretary, J. Taylor, 109 Highbourne Road, Moston.

NORTHAMPTON.—Northampton Natural History Society and Field Club (Photographic Section), 7 Abington Street. Secretary, C. H. Donnan, 51 Abington Street.

NORTH SHIELDS.—Shields and District Camera Club, Studio, Albion Road. Secretary, W. Summerside Irvin, Scotswood House, Gosforth.

NOTTINGHAM.—Nottingham Camera Club, Mechanics' Institution. Secretary, H. Wilkins, 352 Alfreton Road.

OLDHAM.—Oldham Photographic Society, The Lyceum. Secretary, Thos. Widdop, 17 Queen Street.

OXFORD.—Oxford Camera Club (University Museum). Secretary, Geo. W. Norton, 13 Park Terrace.

PAISLEY.—Paisley Photographic Society, 9 Gauze Street. Secretary, Robert Milne, 21 Glenview Terrace.

PENZANCE.—Cornish Camera Club, The Studio. Secretary, H. Tonkin, 22 Market Place.

PETERBOROUGH.—Peterborough Photographic Society, Bedford Temperance Hotel. Secretary, A. W. Nicholls, 11 Cromwell Road.

PLYMOUTH.—Plymouth Photographic Society, Athenæum, George Street. Secretary, W. H. Harris, 5 Clarendon Place, Citadel Road.

PLYMOUTH.—Plymouth Photographic Society, Secretary, I. S. Hawker, Mutley House.

PLYMOUTH —Plymouth Lantern Slide Exchange Club. Secretary, I. S. Hawker, Mutley House.

PLYMPTON.—Plympton Photographic Society, Plympton. Secretary, T. H. Wilks, Plympton House.

POOLE.—Poole Natural History Society, Poole Free Library and School of Art. Secretary, J. R. Eldridge, 142 High Street.

PRESCOT.—Prescot and District Amateur Photographic Association, Bank Buildings. Secretary, W. Langley, Plumbs House, Scotch Lane.

PRESTON.—Preston Scientific Society (Photographic Section), 119A Fishergate. Secretary. A. W. Cooper, 3 Stanley Terrace.

PUDSEY.—Pudsey and District Photographic Society, Mechanics' Institute. Secretary, R. Waring-Taylor, Boarding House, Fullneck, near Leeds.

RAMSGATE.—Isle of Thanet Photographic Society, Church Club, Broad Street. Secretary, I. C. Goldsack, "Llanberis," Grove Road.

RAMSGATE —Ramsgate Camera Club, Victoria Hotel. Secretary, F. J. Bear, 1 Guildford Lawn.

REDDITCH.—Redditch Amateur Photographic Society, Redditch Institute. Secretary, A. Parr, The Hollies, Beoley.

RICHMOND.—Richmond Camera Club, Greyhound Hotel. Secretaries, J. D. Gibson, 40 Threadneedle Street, London, E. C., and Howard Dale, 105 Sheen Road, Richmond.

ROCHDALE.—Rochdale and District Photographic Society. Secretaries, H. Bamford, 242 Yorkshire Street, and R. J. Mills, 60 Mitchell Street.

RODLEY.—Rodley Photographic Society, Rodley. Secretary, H. Crossley.

ROCHESTER.—Rochester Naturalists' Club (Photographic Section), Mathematical School. Secretary, J. Hepworth, Linden House.

ROSSENDALE.—Rossendale Camera Club, 12 Lord Street, Rawtenstall. Secretary, E. R. Taylor, 23 Bank Street, Rawtenstall.

ROTHERHAM.—Rotherham Photographic Society, 5 Frederick Street. Secretary, H. C. Hemmingway, Grosvenor Terrace, Tooker Road.

SCARBOROUGH.—Scarborough and District Photographic Society, The Museum. Secretary, H. Wanless, 31 Westborough.

SHAW.—Shaw Church Institute Photographic and Art Society, Shaw Church Institute. Secretary, J. Maiden, 91 Rochdale Road.

SHEERNESS.—Sheerness Camera Club, Conservative Club, Broadway. Secretary, A. D. L. Hughes, 14 Edward Street.

SHEFFIELD.—Sheffield and Hallamshire Photographic Society, 218 Fitzwilliam Street. Secretary, F. Lowe, 361 Sharrow Vale Road.

SHEFFIELD.—Sheffield Optical Lantern Society, St. Paul's Schools, Cambridge Street. Secretary, T. G. F. Allen.

SHEFFIELD.—Sheffield Photographic Society, Masonic Hall, Surrey Street. Secretary, G. W. Blackwell, 96 Andover Street.

SOUTHPORT.—Southport Social Photographic Club, 15 Cambridge Arcade. Secretary, G. Cross, 15 Cambridge Arcade.

SOUTHSEA.—Southsea Amateur Photographic Society, 5 Pembroke Road, Portsmouth. Secretary, F. J. Mortimer, 10 Ordnance Row, Portsea.

STAFFORD.—Stafford Amateur Photographic Society, Y. M. C. A., Gaol Square. Secretary, F. Cliff, 11 Gaolgate Street.

STOCKPORT.—Stockport Photographic Society, Mechanics' Institution. Secretary, T. Allott, 108 Shaw Heath.

SUNDERLAND.—Sunderland Photographic Association, Fawcett Street Café. Secretary, W. I. Pope, New Arcade.

SUTTON.—Sutton Photographic Club, Public Hall Chambers. Secretary, A. P. Hoole, The Willows.

TUNBRIDGE WELLS.—Tunbridge Wells Amateur Photographic Association, Mechanics' Institute. Secretary, J. Chamberlain, Tankerville, Cambridge Street.

UTTOXETER.—Uttoxeter Photographic Society, Carter Street. Secretary, Rev. C. F. L. Barnwell, Stramshall Vicarage.

WAKEFIELD.—Wakefield Photographic Society, Church Institute, Westgate. Secretary, W. T. Wilkinson, 19 Queen Street.

WALSALL.—Walsall Amateur Photographic Society, Y. M. C. A. Secretary, E. A. Day, 53 Lichfield Road.

WALTHAMSTOW.—Walthamstow Photographic Society, Mission Cottage, Vestry Road. Secretary, W. E. Lane, 24 Prospect Hill.

WATERLOO.—Waterloo and Blundellsands Photographic Society, 65 St. John's Road. Secretary, G. D. Dean, The Dunes, Blundellsands, Liverpool.

WARRINGTON.—Warrington Photographic Society, School of Science. Secretary, F. W. Knowles, 77 Bridge Street.

WEMYSS BAY.—Clydesdale Camera Club, Wemyss Bay. Secretary, Hon. Agnes C. Burns, Castle Wemyss.

WEST BROMWICH.—West Bromwich Municipal Science School Photographic Society, Municipal Science School. Secretary, F. W. Cotterill, Ellacombe, Beeches Road.

WEYMOUTH.—Weymouth and District Camera Club, Oddfellows' Hall, Market Street, Secretary, H. Groves, Rodwell.

WHITBY.—Whitby Camera Club, West Cliff Boarding House. Secretary, G. S. French. Architect, West Cliff.

WIDNES.—Widnes Photographic Society, Bedford Chambers. Secretary, A. J. Squires, 84 Derby Road, Farnworth.

WIGAN.—Wigan Photographic Society, Quadrant Café, Rodney Street. Secretary, F. Betley, 10 Springfield Street.

WOOLWICH.—Woolwich Photographic Society, St. John's Schools. Secretary, F. W. Machen, 161 Griffin Koad, Plumstead, S. E.

WOODFORD.—Woodford Photographic Society, Wilfrid Lawson Hotel, Woodford Green. Secretary, F. G. Emles, 1 Florence Villas, Chelmsford Road.

WORCESTER.—Worcestershire Photographic Survey Society. Secretary, T. J. Hobson, 15 Albany Terrace, Britannia Square.

WORCESTER.—Worcester Tricycle Club Camera Section. Secretary, T. J. Hobson, 15 Albany Terrace, Britannia Square.

YEADON.—Yeadon and District Photographic Society, Town Hall. Secretary, R. P. Jibson, Westfield.

YORK.—York Photographie Society. Secretary, F. G. P. Benson, 50 Scott Street.

YORK.—Yorkshire Philosophical Society (Photographic Section), The Museum. Secretary, H. Dennis-Taylor, F.R.A.S., Trenfield, Holgate.

BRITISH COLONIES.

AMATEUR PHOTOGRAPHIC ASSOCIATION OF VICTORIA.—Hon. Secretary, J. H. Harvey, 278 Victoria Parade, East Melbourne, Australia.

AMATEUR PHOTOGRAPHIC SOCIETY OF MADRAS.—Hon. Secretary, F. Dunsterville, Royapuram, Madras, India.

AUCKLAND PHOTOGRAPHIC CLUB.—Hon. Secretary, G. R. Boulton, Queen Street, Auckland, N. Z.

BALLARAT AMATEUR PHOTOGRAPHIC ASSOCIATION.—Hon. Secretary, F. Foster, 146 Lydiard Street, Ballarat, Australia.

CAPE TOWN PHOTOGRAPHIC CLUB.—Hon. Secretary, A. J. Fuller, Defence Department, Grave Street, Cape Town, South Africa.

CANTERBURY PHILOSOPHICAL INSTITUTE (PHOTOGRAPHIC SECTION).—Hon. Secretary, S. Page, Canterbury, New Zealand.

DUNEDIN PHOTOGRAPHIC SOCIETY.—Hon. Secretary, R. A. Ewing, care of N. Z, Drug Co., Dunedin, New Zealand.

DURBAN AMATEUR PHOTOGRAPHIC CLUB.—Secretary, J. H. Barn, Durban, Natal, Cape Colony.

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KIMBERLEY CAMERA CLUB.—Hon. Secretary, Malcolm Macfarlane, Kimberley, South Africa.

KING WILLIAM'S TOWN CAMERA CLUB.—Headquarters at King William's Town, South Africa.

MADRAS FINE ARTS SOCIETY (PHOTOGRAPHIC SECTION).—Hon. Secretary, E. T. Robertson, Singapore, India.

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PHOTOGRAPHIC SOCIETY OF CEYLON.—Headquarters at Ceylon, India.

PORT ELIZABETH PHOTOGRAPHIC CLUB.—Headquarters at Port Elizabeth, South Africa.

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PHOTOGRAPHIC SOCIETY OF NEW SOUTH WALES.—Hon. Secretary, E. T. Davis, 105 Womerah Avenue, Darlinghurst, Sydney, N. S. W.

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QUEENSLAND PHOTOGRAPHIC SOCIETY.—Hon. Secretary, C. M. Allen, Diocesan Registry, George Street, Brisbane.

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BERLIN FREIE VEREINIGUNG VON PHOTOGRAPHEN.—Sec., Frans Goerke, Massen-Str. 32, Berlin, W.

BERLIN PHOTOGRAPHISCHER-VEREIN.—Addr. Dr. A. Miethe, Rathenon, Berlin.

BERLIN VEREIN ZUR FORDERUNG DER PHOTOGRAPHIE.—Addr. Leon Christman, Winterfeld-Strasse 23, Berlin, W.

BERLIN VEREIN PHOTOGRAPHISCHER MITARBEITER.Addr. Alexander-Strasse 30 Berlin, C.

BRAUNSCHWEIH VEREIN VON FREUNDEN DER PHOTOGRAPHIE.—Addr. Jean Schombart, Brunswick.

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BREMEN GESELLSCHAFT VON FREUNDEN DER PHOTOGRAPHIE.—Addr. F. Tellman, Kronen-Str. 21, Bremen.

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Dresden Amateur Photographen-Verein.—Addr. Dr. Kuppendorf, Bismarck-Str. 16, Dresden.

Essen und Benachbare Stadte. Photographische Genossenschaft.—Addr. H. Witticamp, Hügel-Str. 49 Essen a/Ruhr, Essen.

Frankfurt a/M. Amateur Photographen-Verein.—Addr. Theod. Kühn. Restaurant Hartmann, Bockenheimer. Frankfurt a/M.

Frankfurt a/M. Club von Amateur Photographen.—Gustave Rapp, Kröger-Str. 2, Frankfurt a/M.

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Göttingen Photographischer-Verein.—Addr. Prof. D. Berendson, Rothestrasse 5, Göttingen.

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Hannover Photographischen Verein.—Dr. J. Knoevenagel, Falken-Strasse, 9, Hannover.

Jena Gessellschaft von Freunden der Photographie.—Addr. Carl Zeiss, Optische Werkstätte. Jena.

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Munchen Photographische Gesellschaft.—Addr. Deutsches Haus, Karlsplatz.

Munchen Photographischer Club.—Addr. C. Mebelacker, Schwanthaler-Str. 34.

Nürnberg Photographen-Verein.—Addr. "Stadt Wien."

Nürnberg Verein von Freunden der Photographie.—Addr. Theodore Kraft, Hallerwiese, 8.

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PHOTO-CLUB MONTILIEN.—Sec., Derve (Corporal Sedentary of the Forests), á Montélimar.

PHOTO-CLUB NANCÉEN.—Sec., N. P. Bossert, Rue St. Dizier 45, Nancy.

PHOTO-CLUB ROUENNAIS,—Sec., Louis Chesneau-Lethullier, Quai Cavalier de la Salle 2, Rouen.

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SOCIÉTÉ DES AMATEURS ET PHOTOGRAPHES DE L'EURE.—Sec., Ferd. Lemarié (architect), Evreux.

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Société Photographique de Picardie.—Sec., H. Dabonneville, Rue Gresse 60, Amiens.

Société Photographique de Toulouse.—Sec., Prof. C. Fabre, Rue Fermat 18, Toulouse.

Société Photographique de Touraine.—Sec. Bernier, Rue Victor Hugo, 96, Tours.

Société Photographique de Rennes.—Sec., Gustav Maruelle, Rue Baudrairie 2, Rennes.

Société Photographique de la Flèche (Sarthe).—Sec., Bossin, Rue de la Tour, La Flèche.

Société Photographique de la Gironde.—Sec., Ch. Deleyre, Rue Pelegrin 60, Bordeaux.

Société Photographique de la Savoie.—Sec., P. de Guillebon, Place Saint Léger 72. Chamberg.

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Société Photographique du Sud-Ouest.—Sec., E. Ricard, Chemin de la Colonne, Angoulème.

Société Photographique et Aristique de Limoges.—Sec., A. de Galard-Bearn, Avenue Garabaldi, 5, Limoges.

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Société Versaillaise de Photographie.—Sec., Jessé Curely, Rue de Satory 28, Versailles.

Union Française de la Jeunesse.—Sec., G. Felpin, Rue de Passy 74, Paris.

Union National des Sociétés Photographiques de France.—Sec., M. S. Pector, Rue des Petits-Champs 76, Paris.

Union Photographique du Pas-de-Calais.—Sec., J. Descamps, Boulevard Mariette 3, Boulogne-sur-Mer.

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Mutuelle Photographique Belge.—President, Aug. Lemaire, addr. Bd. du Hainaut 94, Bruxelles.

Photo Club Hutois.—Sec., A. Lammerl, Athenée Royal, Huy.

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Amateur Fotografen-Vereeniging.—Amsterdam. Secretary, Michel Ameschat, Amsterdam.

Amateur Fotografen-Vereeniging, "W.I.K."—Amsterdam. Secretary, J. W. H. Van Staer.

Amateur Fotografen-Vereeniging "Daguerre."—Groninogue. Secretary, G. P. Smith, Groninogue.

Bredasche Amateur Fotografen-Vereeniging.—Breda. Secretary, J. S. Rinhes, Bread.

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Haagsche Amateur Fotografen-Vereeniging.—Haag. L. Th. G. Mollenger, Haag.

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Nederlandsche Vereeniging van Dilettant Fotografen.—Secretary, J. W. H. Van Staa, Amsterdam.

SWITZERLAND.

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Club Photographique de Zürich.—Secretary, E. Strahl-Nieriker, Zürich.

Club Photographique de Vevey.—Secretary, B. Nicole, Vevey.

La Société Photographique de Lausanne.—Secretary. E. Gautschy, Rue de Bourg, Lausanne.

Photo Club de Neuchâtel.—Secretary, P. A. Perroehet, Neuchâtel.

Société Génévoise de Photographie.—Geneva, Secretary, J. Rey, Geneva.

Société Photographique de Berne.—S. S. Falquet, Berne.

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PHOTO CLUB OF CEARÀ.—Secretary, João Sidrin, Photo Club of Ceará, Brazil.

JAPAN.

JAPAN, PHOTOGRAPHIC SOCIETY OF.—Secretaries, Prof. H. Ishikaua and Prof. W. K. Burton, Ilchome Nagatacho, Tokio, Japan.

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East Pasadena—The Raymond.
Monterey—Del Monte.
Santa Barbara—San Marco.
San Diego—Hotel Coronado.
San Rafael—Hotel Rafael.
The Geysers, Sonoma Co.—The Geysers.

NEW YORK.

Adirondacks—Cascade Lake House. Has a dark-room with running water.
Big Indian, Catskill Mountains—Slide Mountain House.
Blue Mountain Lake, Hamilton County—Prospect House.
Ellenville, N. Y.—Mt. Meenagha House.
Haines Falls, Green Co.—Kenwood Hotel. Room for two to work at once in dark room.
Lakewood—The Stillingsworth.
Lake George—Fort William Henry Hotel.
Lake George, Bolton—Lake View House.
Lake Minnewaska—Wildmere House.
Lake Mohonk—Lake Mohonk House.
Kidders Ferry, Cayuga Lake—Coles Hotel.
Niagara Falls—Spencer House.
Hunter—Breeze Lawn. Has a dark-room with running water.
Westport—The Westport Inn. Has a dark-room with running water.

NEW HAMPSHIRE.

Littleton—Chiswick Inn.
White Mountains—Profile House and The Flume House.
Mt. Washington—Summit House.

NORTH CAROLINA.

Hot Springs—Mountain Park Hotel.

MICHIGAN.

Oden—The Atherton Hotel.

ONTARIO.

Muskoka, Lake Joseph—The Stanley House.

PENNSYLVANIA.

Dingman's Ferry—High Falls House.
Sullivan Co.—Hotel Eaglesmere.

GEORGIA.

Savannah—Hotel de Soto.

FLORIDA.

St. Johns—Magnolia Hotel.
Tampa—Tampa Bay Hotel.

MAINE.

South Poland—Poland Spring House. Fine studio and three dark-rooms for exclusive use of amateur photographers.

TENNESSEE.

Harrogate—The Four Seasons.

MASSACHUSETTS.

Pittsfield—Maplewood Hotel.

DISTRICT OF COLUMBIA.

Washington—Arlington Hotel.

NEW BRUNSWICK.

St. Andrews—The Algonquin.

UNITED STATES REVENUE STAMP TAX.

Bank Checks	$0.02
Bankers—for first $25,000 of capital	50.00
For each $1,000 in excess of $25,000	2.00
Brokers	50.00
Pawnbrokers	20.00
Commercial Brokers	20.00
Custom House Brokers	10.00
Theatres, Museums, and Concert Halls in cities, population 25,000	100.00
Circus	100.00
Public Exhibitions	10.00
Bowling Alleys, each alley	5.00
Billiard Rooms, each table	5.00
Bill of Exchange (foreign) for each $100 or fraction (not in sets)	.04
In sets for each bill of set, for each $100	.02
Bill of Exchange (inland) for each $100 or fraction	.02
Promissory Note	.02
Draft	.02
Certificate of Deposit, drawing interest, per $100	.02
Not drawing interest	.02
Government Money Orders	.02
Bonds—issued by companies, per $100	.05
Foreign, per $100	.05
Agreement of Sale of Merchandise	.01
Telephone Messages, 15c. or more	.01
Bond, indemnifying	.50
Surety Bond	.50
Telegram	.01
Custom House—Entry value, $100, 25c.; $500	.50
Over $500	1.00
Entry for withdrawal	.50
Stocks on sales or transfers, per $100	.02
Money Orders—Foreign Telegraph—per $100	.04
Foreign Letters of Credit—per $100	.04
Drafts payable on sight	.02
Drafts payable on time, per $100 or fraction	.02
Protest of Notes	.25
Lease—One year	.25
Three years	.50
Over three years	1.00
Power of Attorney	.25
Proxy for Voting	.10
Warehouse Receipt	.25
Parlor Car Seat	.01
Sleeping Car Berth	.01
Tobacco—per pound	.12
Tea—per pound	.10
Deed of Real Estate for each $500, or less above $100, or fraction of $500	.50
Mortgage on real or personal estate, first $1,000 exempt. First $1,500 or less, above $1,000	.25
For each $500 or fraction in excess of $1,500	.25

Assignment of Mortgage—same taxes as on mortgage.
Assignment of Lease—same taxes as on lease.

Mixed Flour—upon the person or company engaged in business, per annum	12.00
On each barrel, 4c.; ½ barrel, 2c.; ¼ barrel, 1c.; ⅛ barrel	.04
Beer and other fermented liquors, per barrel	2.00
Cigars—not more than 3 lbs., per 1,000, per thousand	1.00
Weighing more than 3 lbs. per 1,000, per thousand	3.60
Cigarettes—more than 3 lbs. per 1,000, per thousand	3.60
Weighing less than 3 lbs. per 1,000, per thousand	1.50
Insurance—Life, for each $100 or fraction	.08

Industrial, 40 per cent. of the first weekly premium.
Fire, Accident, Inland Marine, Steam-Boiler, etc., ½ of 1 per cent on each $1 of premium or fraction.
Assignment of Policy of Insurance—same tax as original Policy.

PLACES OF INTEREST IN NEW YORK.

American Museum of Natural History, between Eighth and Ninth Avenue, 77th and 81st Street.—Open free every day except Monday and Tuesday, when there is an admission fee of 25 cents. Contains a fine collection of mounted birds, animals, fishes, insects, etc.

Battery Park, at the southern end of the island.—Contains 21 acres, beautifully laid out. A wide promenade extends along the sea wall, from which a fine view of the harbor may be obtained. Named from the battery erected here by the Dutch settlers. The British army embarked here Nov. 25th, 1783, when evacuating New York at the close of the Revolution.

Brooklyn Bridge connects the Borough of Manhattan with the Borough of Brooklyn. Construction begun June 3, 1870. Opened May 24, 1883. Total length, 5989 ft.; width, 89 ft.; height of towers, 278 ft.; height of center above high water, 135 ft.; cost, $15,000,000. Foot passengers free; bridge carfare, 3c., 2 tickets, 5c.; or from any part of Brooklyn Borough to Manhattan, direct, via Elevated or trolley cars, 5c.

Castle Garden, Battery Park.—New York Aquarium. Formerly used for great public meetings and receptions. Admittance to the Aquarium is free; hours from 10 A. M. to 4 P. M.; open daily excepting on Mondays and Tuesdays.

Central Park, between Fifth and Eighth Avenues, 59th and 110th Streets.—2½ miles long and ½ mile wide. Contains 860 acres. It has twelve grand entrances, contains 28 miles of walks, 10 miles of carriage roads, and 5 miles of bridle paths. More than 10,000,000 people visit the park annually.

City Hall, City Hall Park.—Built of marble in 1803. The Governor's room contains the portraits of all the Governors of New York State, the chair and desk at which Washington wrote his first message to Congress and many other relics.

Gen. Grant's Tomb, in Riverside Park at 123rd Street, overlooking the Hudson River. Erected by popular subscription at a cost of nearly $600,000 and dedicated April 27, 1897, with imposing ceremonies. It can be reached by the Sixth Avenue Elevated road to 125th Street, thence by cable cars.

High Bridge, Harlem River at 175th Street.—A stone structure conveying the water of the Croton aqueduct across the Harlem River, at a height of 100 feet, length, 1400 feet.

Metropolitan Museum of Art, in Central Park, near Fifth Avenue and 82d Street.—Open free every day except Monday and Tuesday, when an admission fee of 25 cents is charged. Contains a large and rich collection of some of the best examples of the old masters and modern painters, and a fine gallery of marble statuary.

Obelisk, in Central Park, near Metropolitan Museum, Fifth Avenue and 82d Street — Erected in Egypt about 3500 years ago. It is cut from one solid block of granite, 70 feet high and weighing 40,000 pounds. It is covered with hieroglyphics illustrating the deeds and titles of the King of Egypt at that time. Presented by the Khedive, Ismail Pasha, to the city of New York. Brought here by Lieut. Gorringe, U. S. N., in a vessel specially fitted up for the purpose. The entire cost of transportation and erecting was defrayed by the late William H. Vanderbilt.

Post Office, Broadway and Park Row.—Costing $7,000,000. There are sixteen branch offices.

Statue of Liberty, on Liberty (formerly Bedloe's Island).—Modeled by the French sculptor Bartholdi, and presented by France to the United States. The statue is of copper bronze, 151 feet high; mounted on a stone pedestal 154 feet high, making the extreme height 305 feet. It may be reached by boat from the Barge Office at the Battery.

Sub-Treasury, Wall Street, corner of Nassau.—Built of white granite on the site of old Federal Hall, where Washington was inaugurated. The original building, erected in 1700, was used for the City Hall. The first Congress under the National Constitution met here, March 4th, 1789, when the name was changed to Federal Hall. Afterwards used as the State Capitol, and then the present building was erected and used many years as the Custom House; now occupied for the storage of gold and silver coin, etc. The walls are five and six feet thick, and the roof is of solid stone four feet thick. It is guarded day and night by a force of twenty-five men. On the steps now stands a statue of Washington, the pedestal containing the very stone on which he stood when taking the oath, on April 30, 1789.

St. Patrick's Cathedral, Fifth Avenue, 50th and 51st Streets.—The most imposing church edifice in the United States, costing over $2,000,000. It is 300 feet long, 140 feet wide, and 108 feet high. The twin spires on either side of the front gable rise to a height of 328 feet. The rich stained glass in its 70 windows was made in France and cost $100,000. The main altar, 40 feet high, is made of Italian marble inlaid with rare gems. The organ is one of the largest in the city. The Cathedral is open daily.

St. Paul's Church, Broadway, Cor. Vesey Street.—Erected in 1764. A chapel of Trinity Church. Was attended by Washington, and his pew still remains, marked with his initials.

Trinity Church, Broadway, head of Wall Street. The richest parish in the United States, its annual income reaching $500,000. Was founded in 1697. The church was burned in 1776, rebuilt in 1788, and the present house was completed in 1846. It was designed by the famous American architect Upjohn, and required seven years to build. The steeple is 284 feet high.

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put into the hands of the photographer the means of securing the most delightful pictorial effects without resorting to double exposure or the use of a color screen.

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ROYAL BROMIDE PAPER.—Enlargements on this paper made through bolting cloth and sepia toned have the softness and beauty of rare old etchings. Nearly all of the enlargements shown in our famous London and New York exhibitions, which received such favorable comment from the public and the press, were made on Royal Bromide. The color, tone, texture and all those qualities most valued by the artist are found in Eastman's Royal Bromide Paper.

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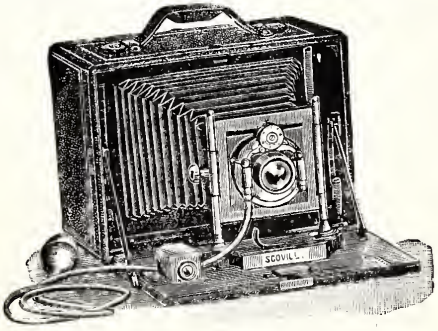
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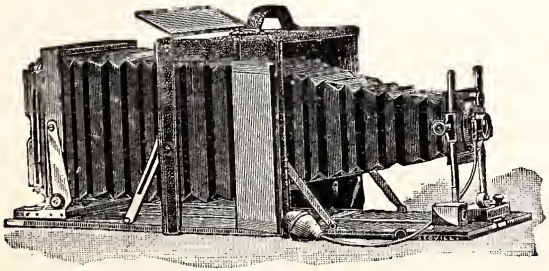
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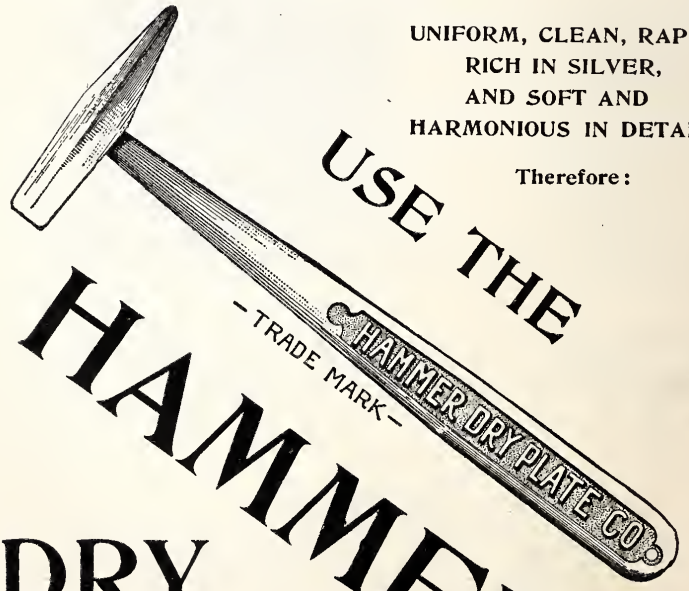
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Makes an artistic print from an indifferent negative.
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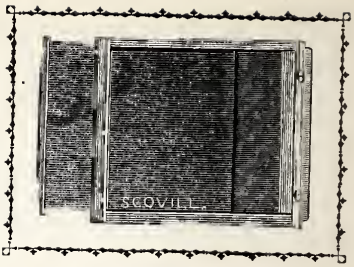


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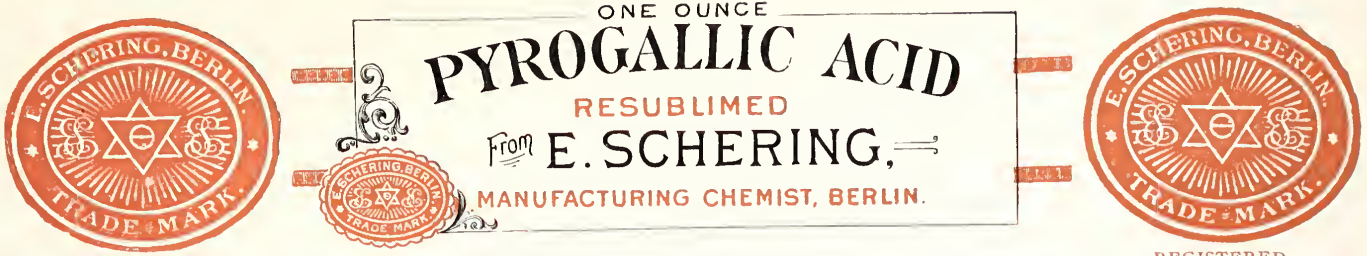
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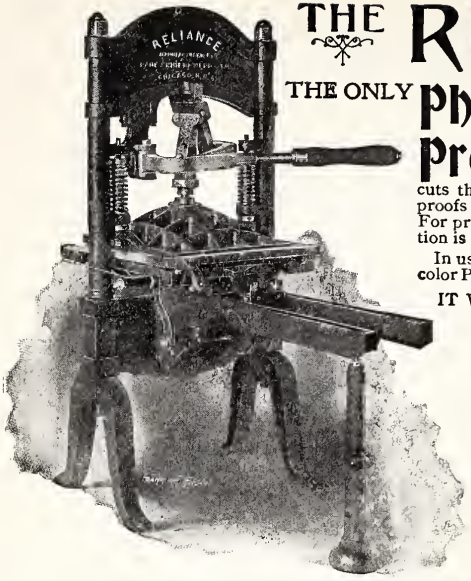
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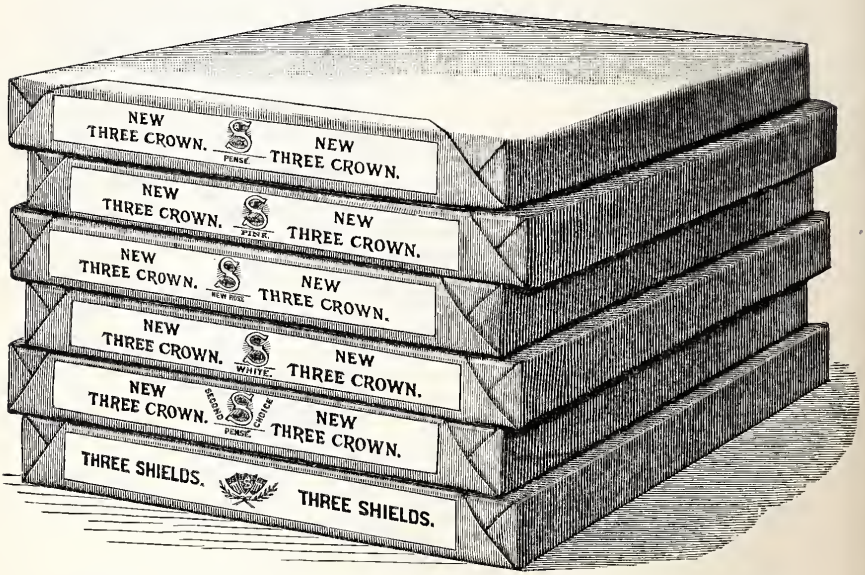


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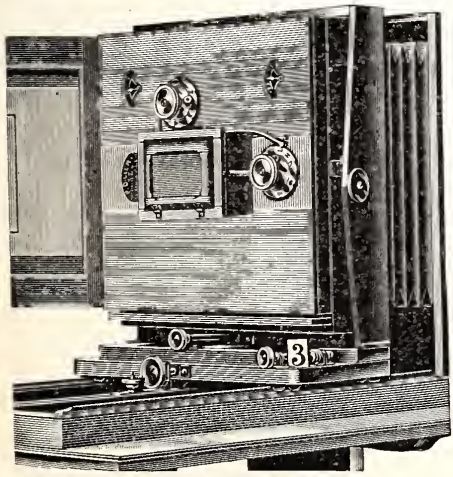
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THE only up-to-date and convenient Holder for producing Button and Stamp Photos cheaply and quickly.

It will fit any 8 x 10 portrait camera without alteration the same as any common Holder. It can also be fitted to smaller as well as larger cameras. It is made to carry either a 4¼ x 6½ or 5 x 7 plate, and from 2 to 28 negatives can be made on the one plate, all alike or all different. Requires no extra lens or stand. It is a business bringer, and will multiply your bank account as well as pictures. Ask your dealer for it. If desired, a pamphlet will be sent on application showing full-size cabinet half-tone pictures, giving full particulars of the Holder.



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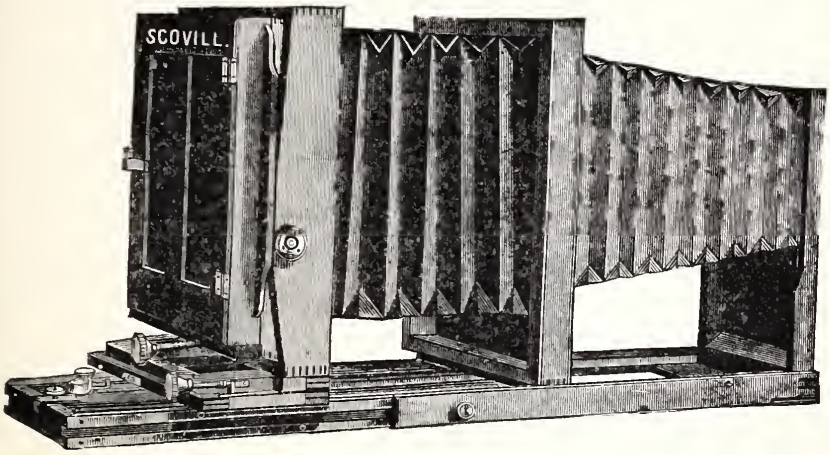
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THE AMERICAN OPTICAL CO.'S UNRIVALED PORTRAIT CAMERAS.

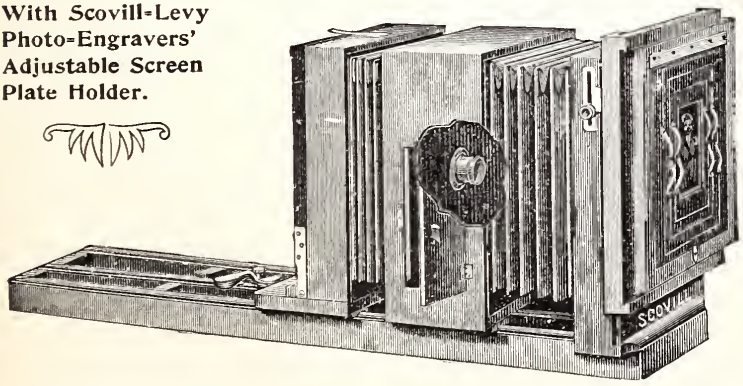


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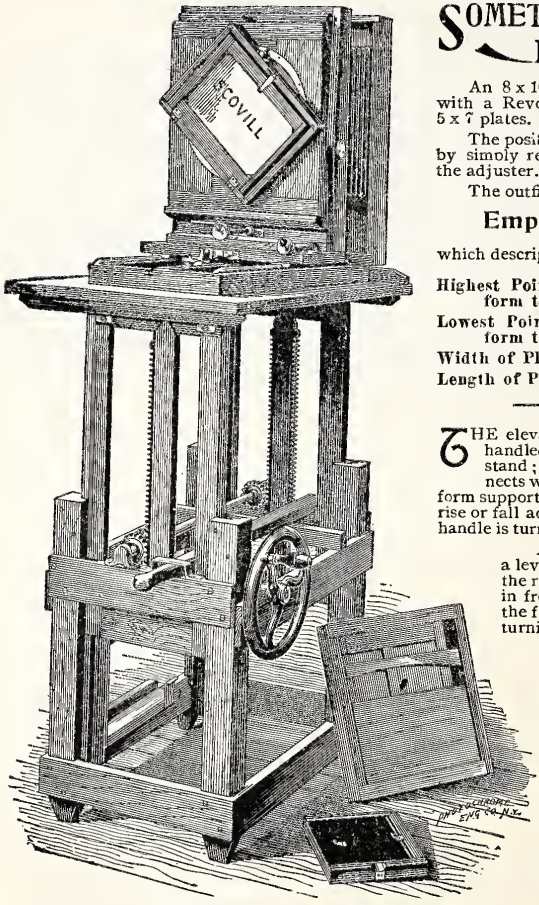


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An 8 x 10 Portrait Camera, fitted with a Revolving Back Adjuster for 5 x 7 plates.

The position of the plate is changed by simply revolving the turn table of the adjuster.

The outfit comprises also an

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Highest Point from Platform to Floor, . . .	**41 Inches.**
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THE elevating is done by turning a handled wheel at the side of the stand; the gearing from this connects with the front and rear platform supports, causing the platform to rise or fall according to which way the handle is turned.

At the back of the stand is a lever, which, when pressed to the right, throws the gear wheel in front out of gear, and locks the front platform support. On turning the handled wheel from you, the back of the platform is raised, giving the platform an inclination forward of about 15 degrees. By pressing the lever arm to the left the front gear is again placed in position, and upon turning the handled wheel from you, the platform may be raised without disturbing the dip of the platform. If the handled wheel is turned toward you, the platform will be lowered without disturbing the dip of the platform.

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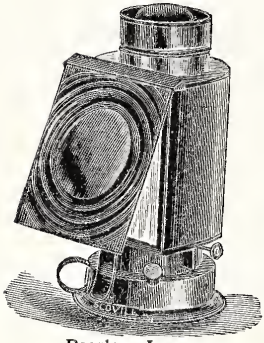
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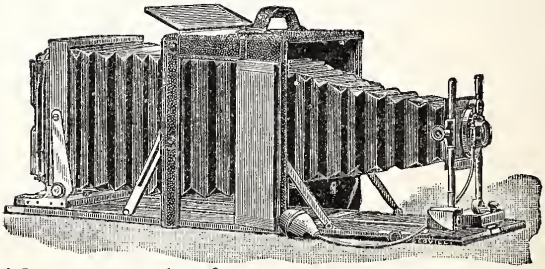
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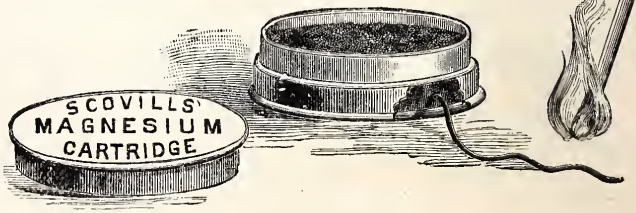
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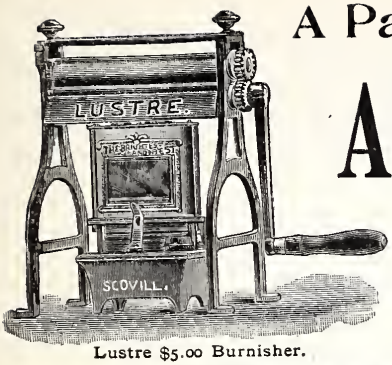
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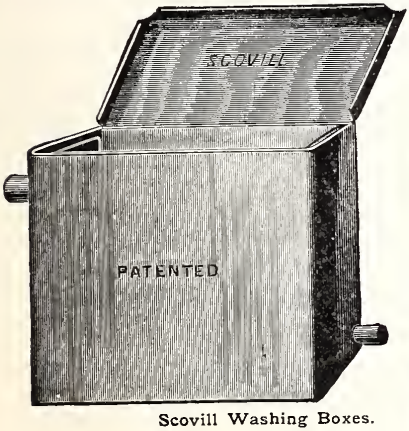
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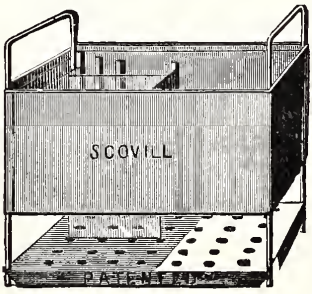
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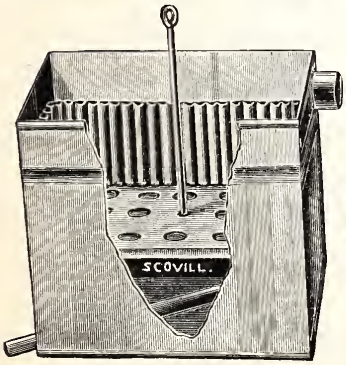


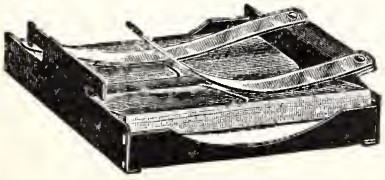
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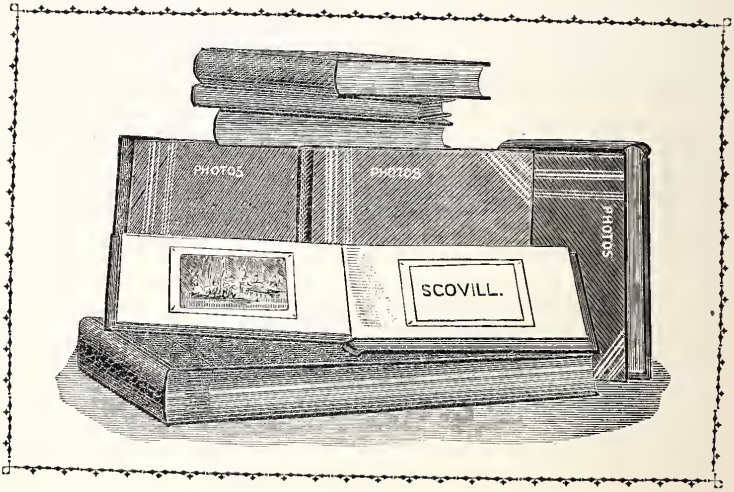
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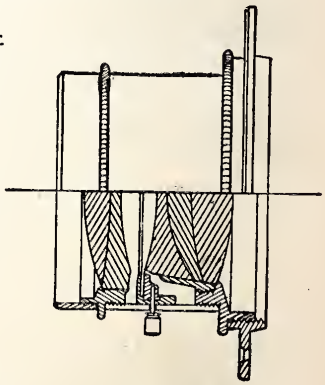
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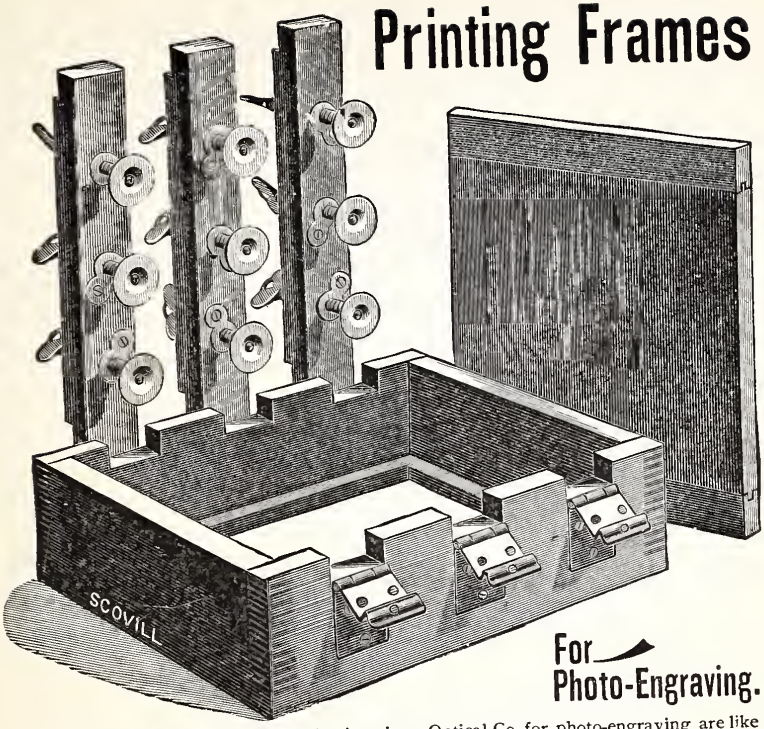
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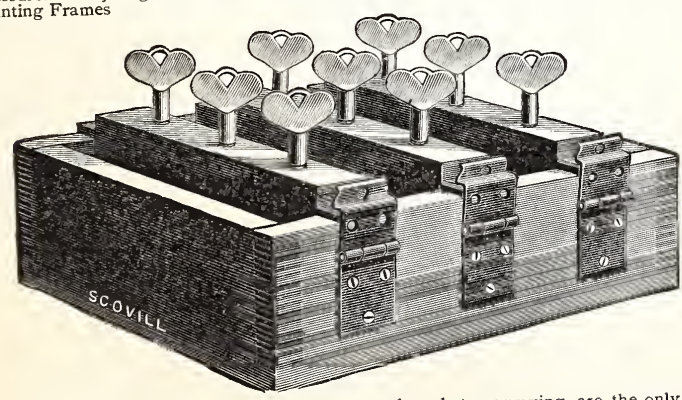
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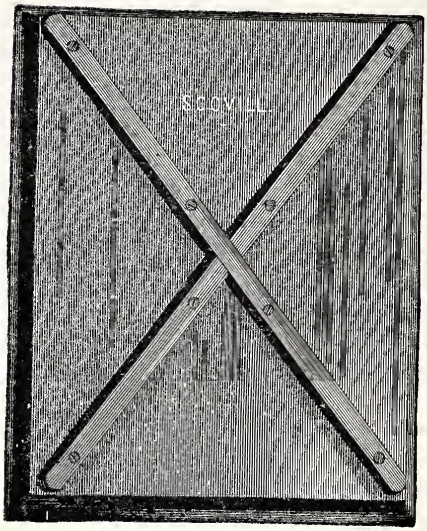
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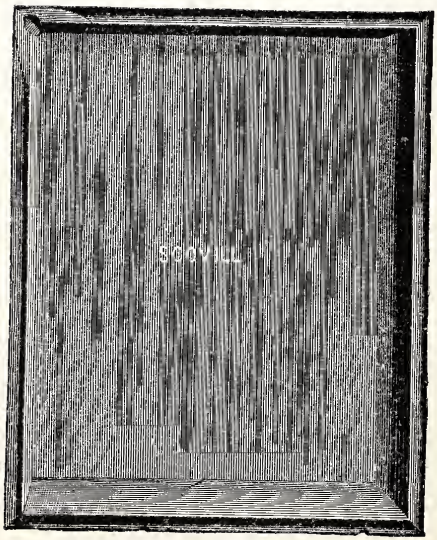
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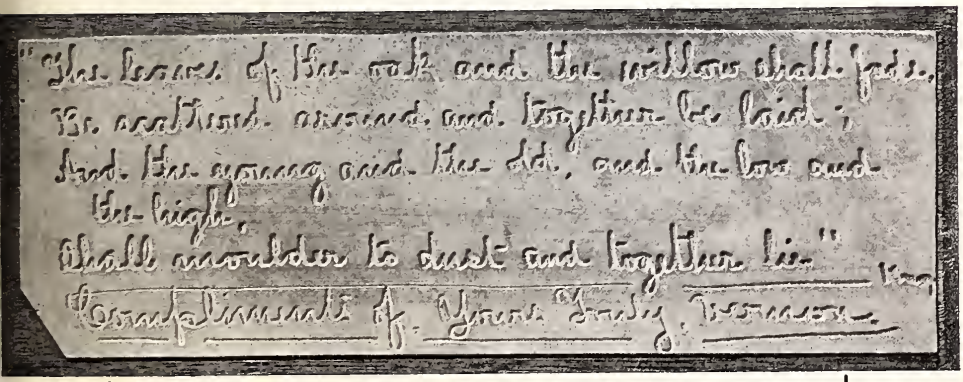


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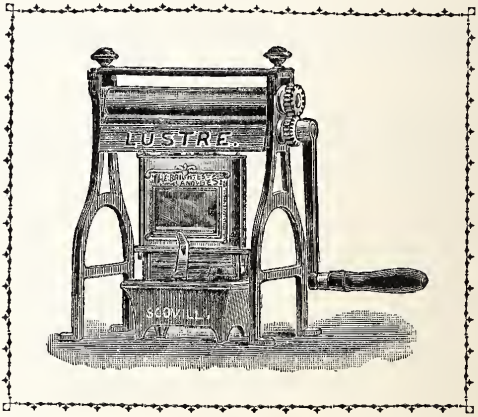
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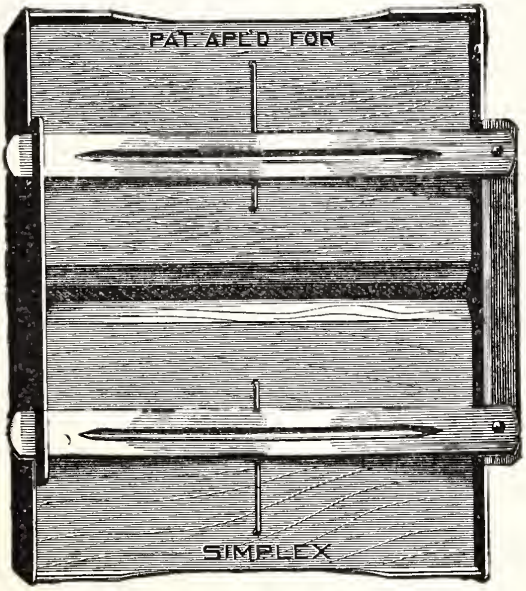
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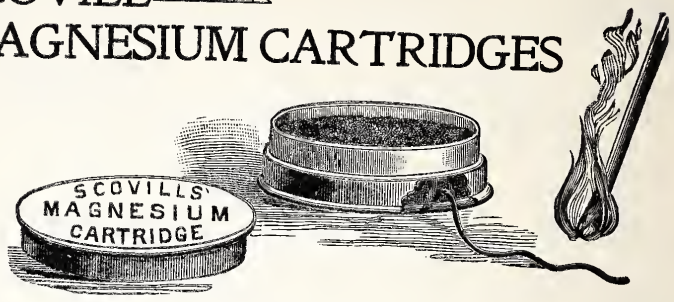
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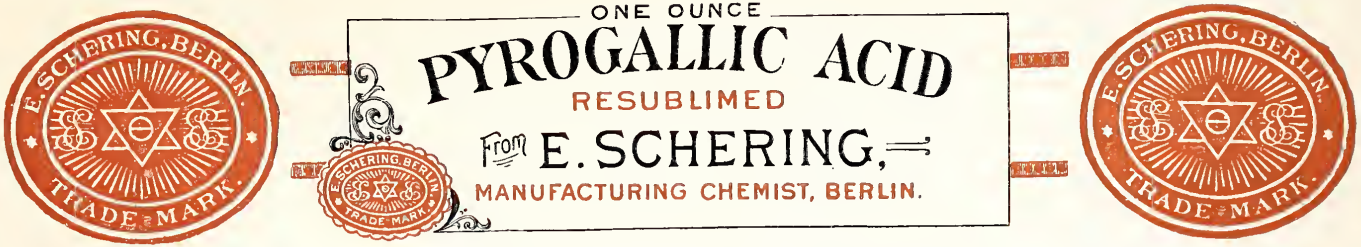
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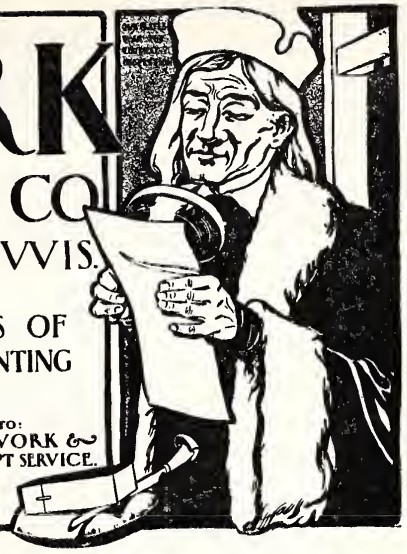
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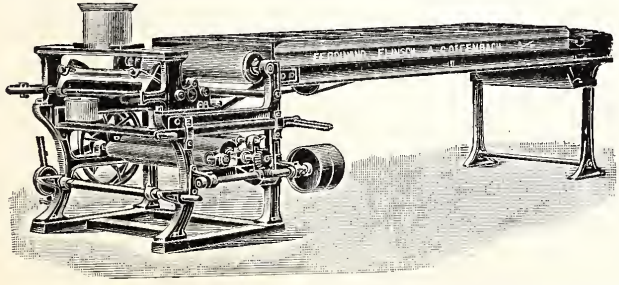
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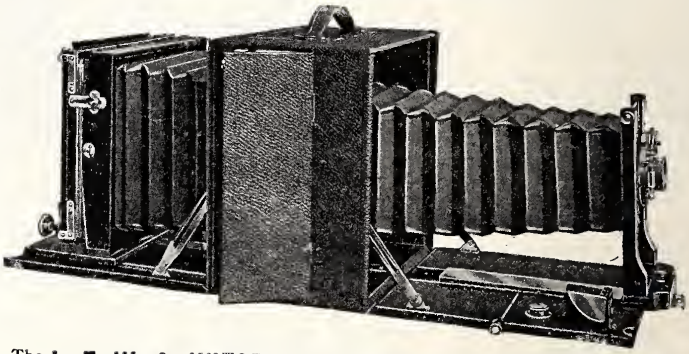
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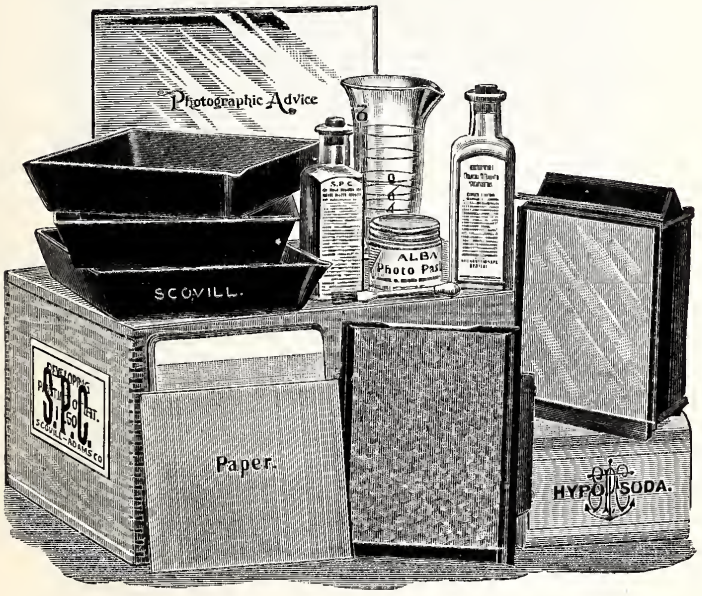
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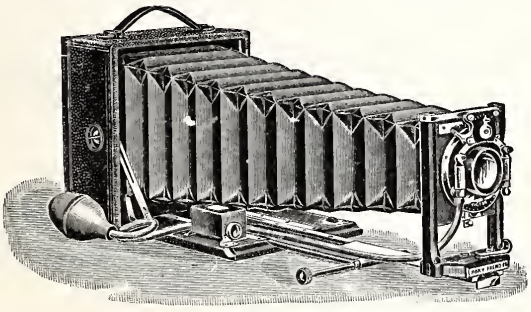
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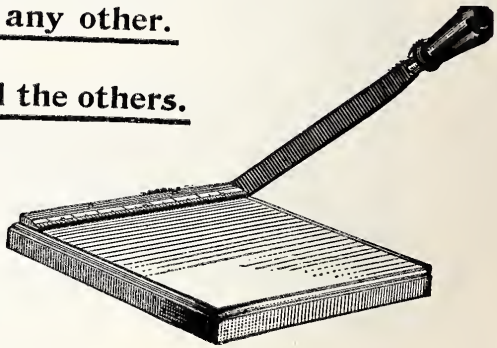
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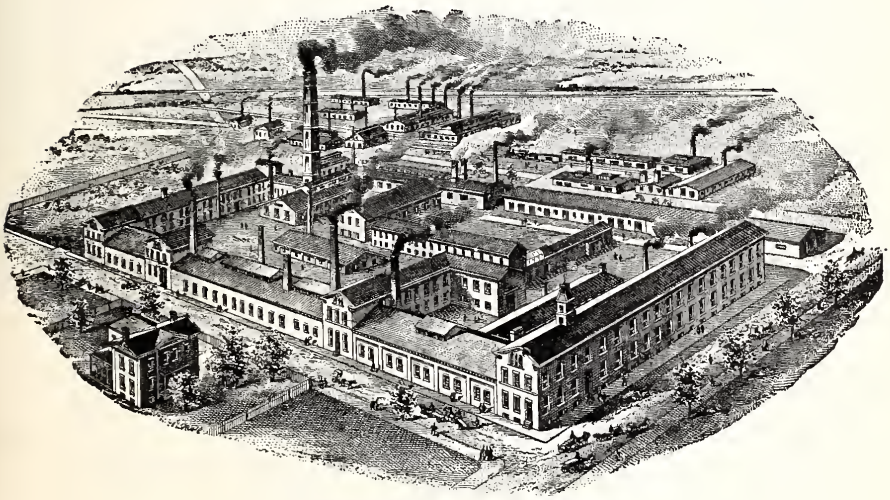
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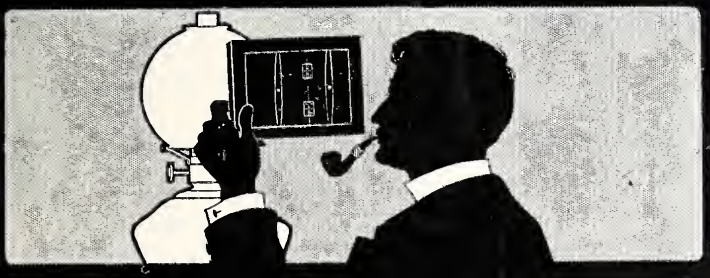
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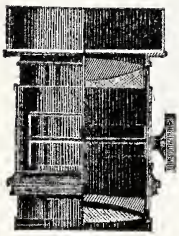


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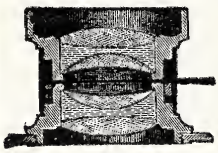


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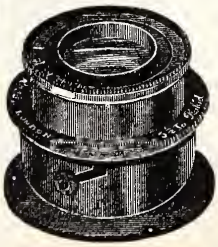
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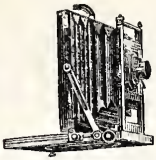
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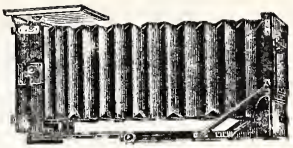












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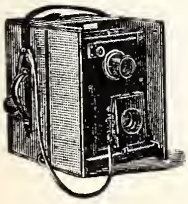
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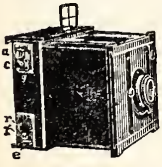
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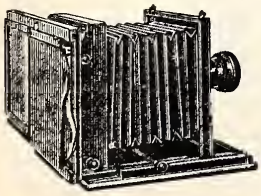
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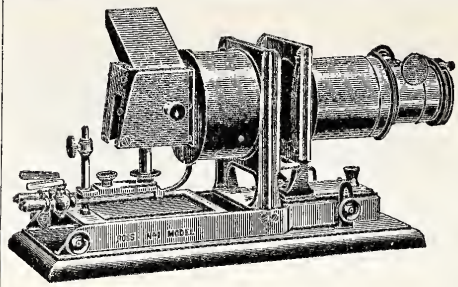
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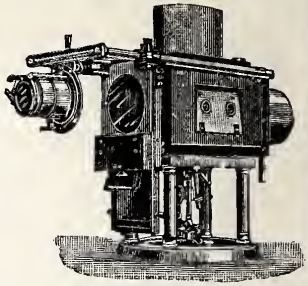
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31, COCKSPUR STREET, CHARING CROSS, S.W.
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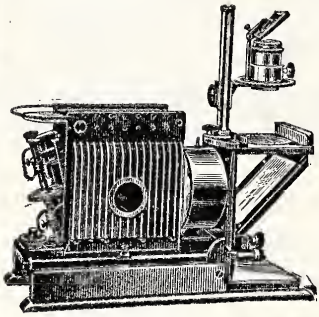












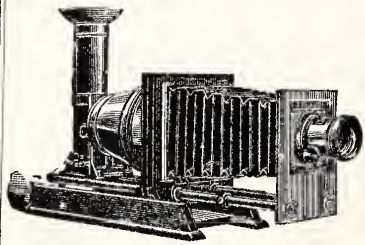
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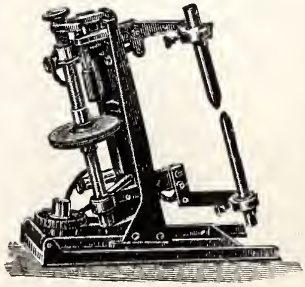


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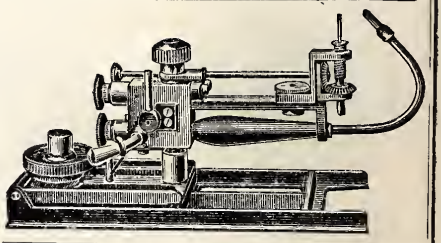
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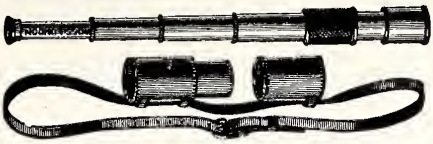


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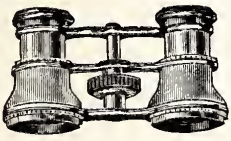
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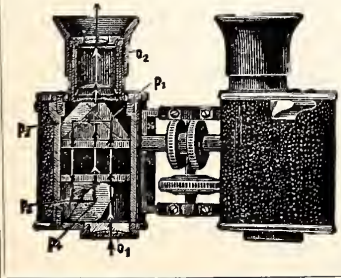
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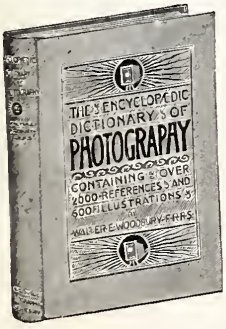
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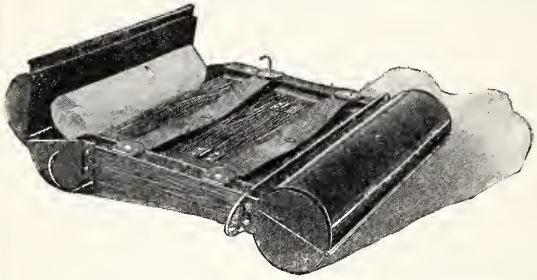
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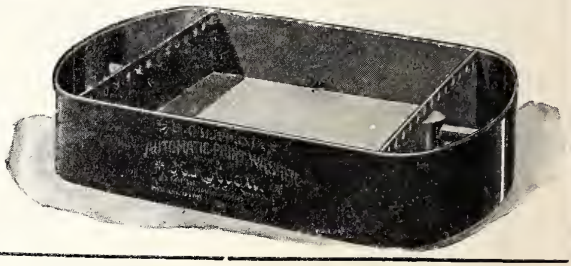
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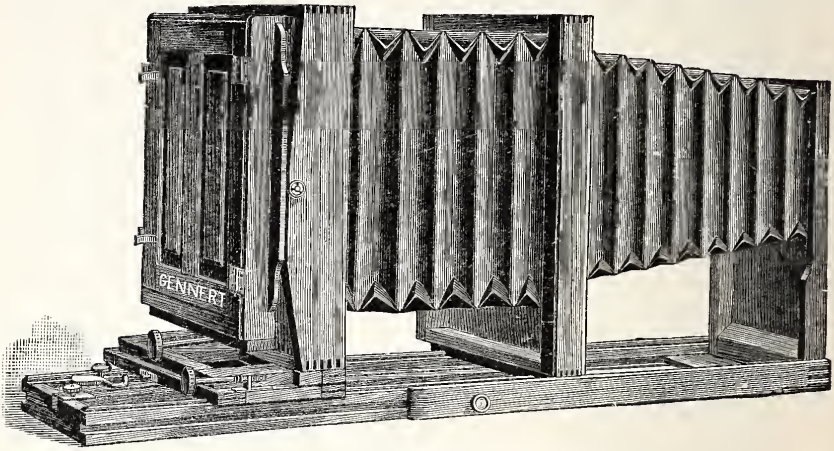
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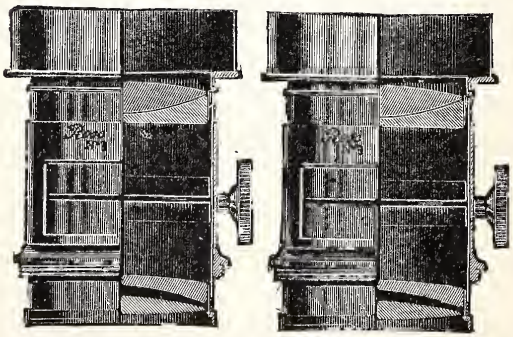
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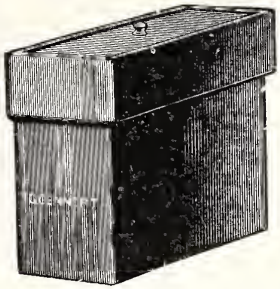
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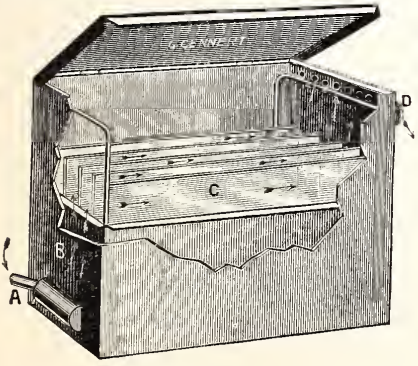


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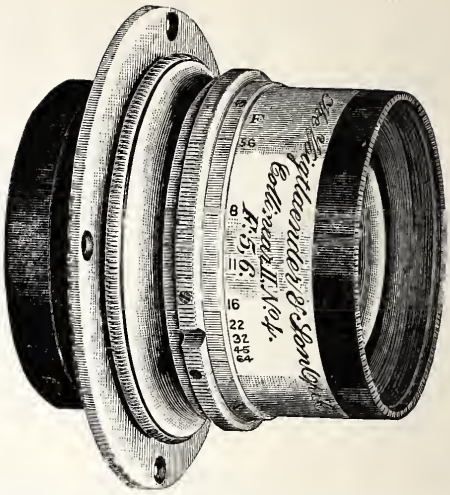
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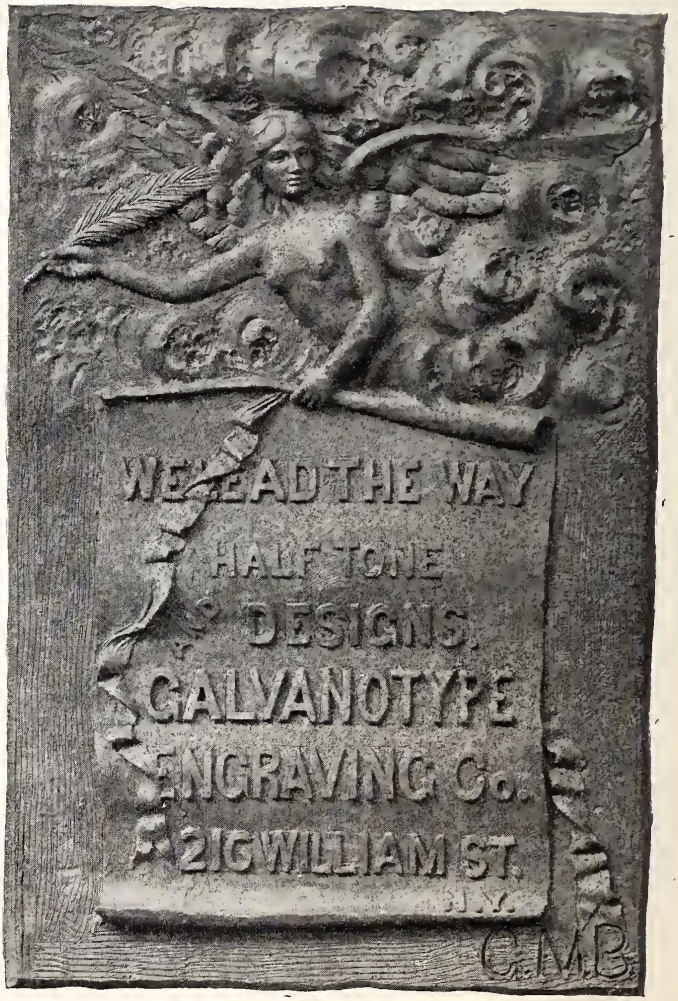
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Scovill's Pyro.
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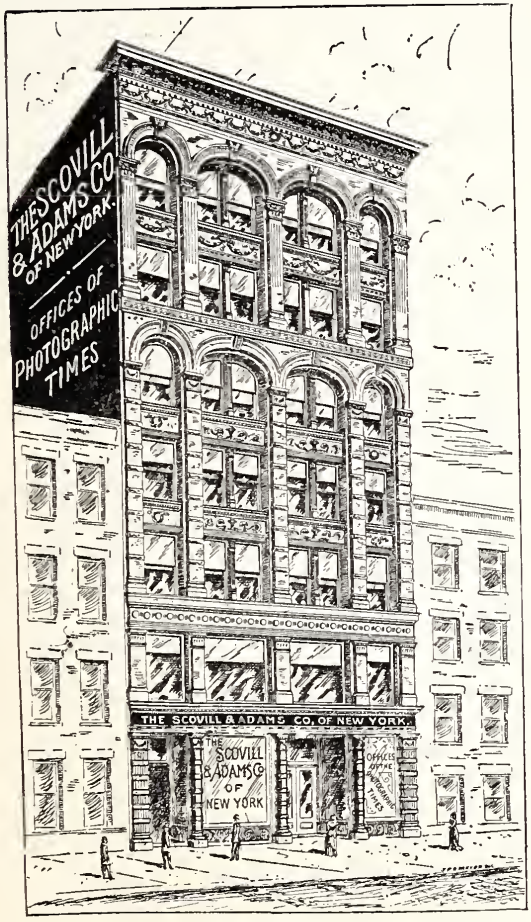
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No. 1. DEVELOPING—PYRO.
(Composed of Sulphite of Soda, Acid Pyrogallic, Acid Citric.)

No. 2. DEVELOPING—SODA.
(Composed of Sulphite of Soda, Carb. Soda and Carb. Potash.)

Nos. 1 and 2 when mixed, as directed on the label, constitute the "Developing Solution," or, as sometimes called, "Developer."

No. 3. FIXING AND CLEARING.
(Composed of Sulphite of Soda, Acid Citric, Chrome Alum.)

No. 4. FIXING AND CLEARING.
(Consists of Hyposulphite of Soda.)

Nos. 3 and 4, when mixed, according to instructions on the label, make the Fixing and Clearing Bath, which can be kept for stock solution if so desired.

No. 5. TONING FOR PRINTS—GOLD CHLORIDE.

No. 6. TONING FOR PRINTS—SODA.

Nos. 5 and 6 constitute the Toning Bath; this must be alkaline.

No. 7. PRINT FIXING—HYPOSULPHITE OF SODA.
This can also be used advantageously for stock solution, a few drops of Aqua Ammonia greatly enhancing its value.

No. 8. BROMIDE OF POTASH.
For checking the too rapid development of over-exposed plates.

Any of the above Tablets can also be procured separately.

Price for Complete Equipment, $3.00.

The **Developing Outfit** containing the following Tablets, with full instructions on each bottle for preparing the solutions:

No. 1. DEVELOPING—PYRO.
(Composed of Sulphite of Soda, Acid Pyrogallic, Acid Citric.)

No. 2. DEVELOPING—SODA.
(Composed of Sulphite of Soda, Carb. Soda and Carb. Potash.)

No. 3. FIXING AND CLEARING.
(Composed of Sulphite of Soda, Acid Citric and Chrome Alum.)

No. 4. FIXING AND CLEARING.
(Consists of Hyposulphite of Soda.)

No. 8. BROMIDE OF POTASH.
For checking the too rapid development of over-exposed plates.

Our Nos. 1 and 2 Developing Tablets are so prepared that those who are in the habit of immersing the plates with Pyro solution first and then adding the Soda, can do so. Our formulas Nos. 3 and 4, for Fixing and Clearing, are of such combination that we dispense entirely with the Alum Bath, thus requiring only two trays to develop and fix the plate.

Price for Developing Outfit, $1.75.

The **Print Toning Outfit** contains the following Tablets, with full instructions on each bottle for preparing the solutions:

No. 5. TONING FOR PRINTS—GOLD CHLORIDE.

No. 6. TONING FOR PRINTS—SODA.

Nos. 5 and 6 constitute the Toning Bath; this must be alkaline.

No. 7. PRINT FIXING—HYPOSULPHITE OF SODA.
This can also he used advantageously for stock solution, a few drops of Aqua Ammonia greatly enhancing its value.

Any of the above can also be secured separately in bottles of 100 tablets each.

Price for Print Toning Outfit, $1.75.

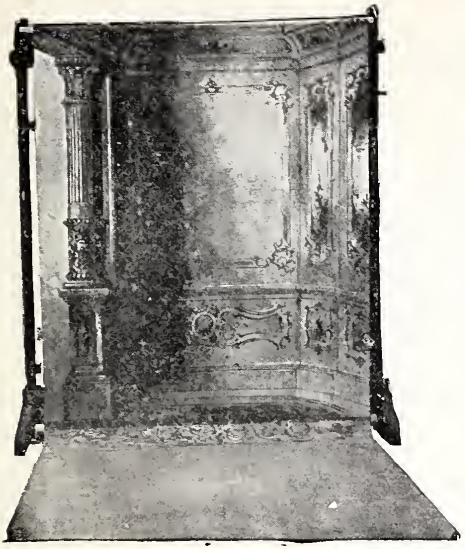
Explicit Instructions will be found in the General Pamphlet contained in each outfit.

Prices of Separate Bottles of 100 Tablets each:

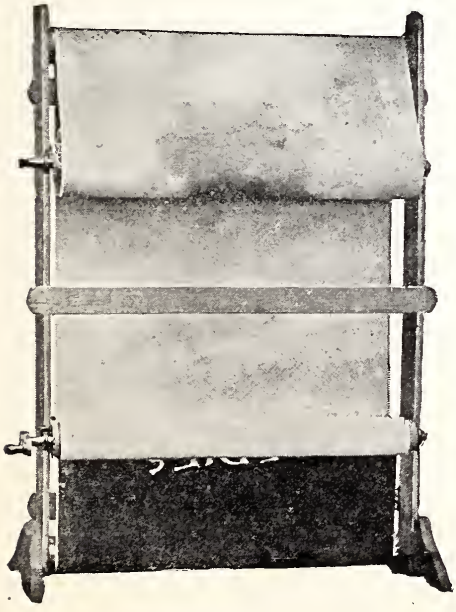
No. 1	$0.75	No. 3	$0.40	No. 5	$1.50	No. 7	$0.35
No. 2	30	No. 4	35	No. 6	18	No. 8	25

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With Adjustable Telescopic Stand

TO BE USED WITH

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Patented Everywhere.



The "Weiss" Flashlight Apparatus

Is a **Safe** and **Reliable Apparatus** meeting all requirements with the following **Advantages:**

EASY to handle and acts at the desired moment.

EXCLUDES every possibility of untimely ignition.

AVOIDS contortion of features and closed eyes.

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Is INDISPENSABLE to PROFESSIONALS AND AMATEURS alike.

Produces SOFT RESULTS.

The only Apparatus which, when used with the Flash Powder "Argentorat," will give an illuminating power equal to the quantity of powder used.

ONE Lamp suffices for ALL PURPOSES.

The Flashlight Powder, "Argentorat"

Which possesses in the highest degree those actinic qualities which alone can ensure well-exposed Negatives in all cases.

Gives an INSTANTANEOUS flash of the most powerful light. RETAINS this power in illuminated rooms as well as in daylight.

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CONSUMES ITSELF completely.

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Is not Hygroscopic, and does not clog.

Keeps for an indefinite period. Must NOT be used with Pneumatic Apparatus.

PRICE, WITH FULL INSTRUCTIONS:

Apparatus, with Telescopic Standard and 1 pair of Extenders,	$7.50
Extra Extenders (per pair),	0.75
Flashlight Powder, "Argentorat," 100 grammes,	1.25
Friction-Block (per half dozen)	0.50

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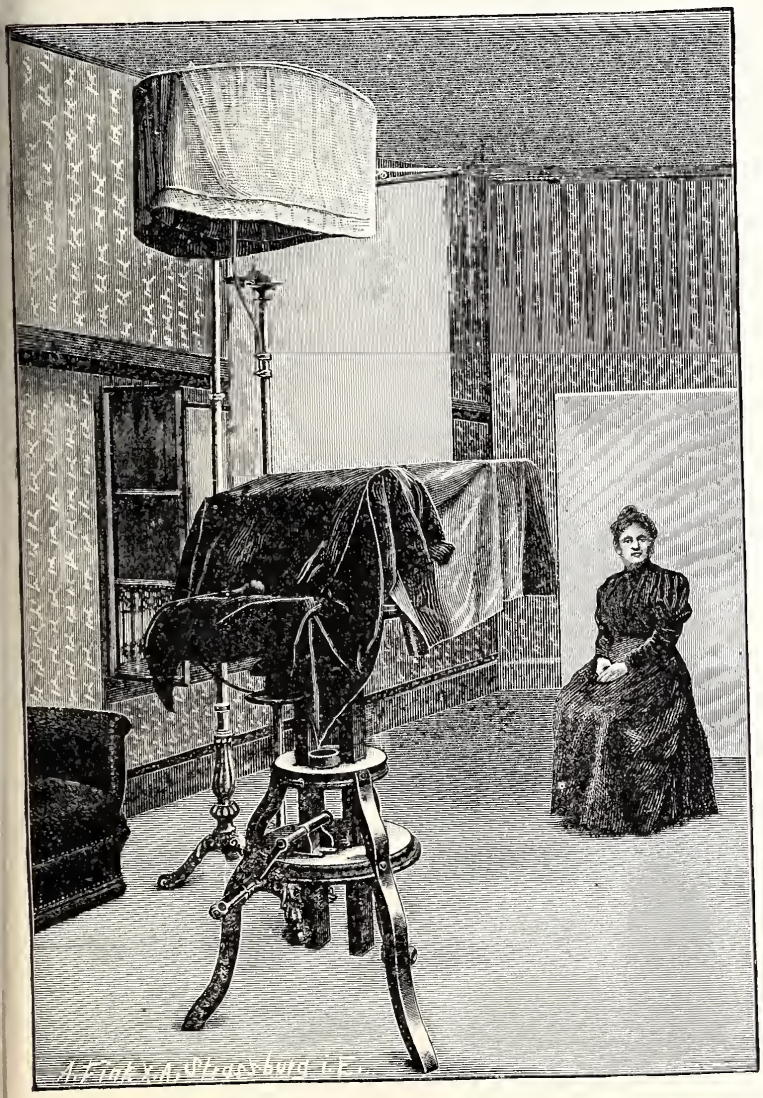
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Renders the ***finest results*** in ***Studio*** and "***At Home***" portraiture ***Day*** or ***Night***. ***Can*** be transported with facility.

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Creates some ***very striking*** and ***charming light-effects.***

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Is worked with ***only one Lamp***, and ***without Reflectors.***

Does not produce disturbing reflections or false light effects.

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PRICE.—The Studio Apparatus, including a "WEISS" Instantaneous Flash Lamp, and five boxes of "ARGENTORAT" Powder for same, $75.00 of all Dealers.

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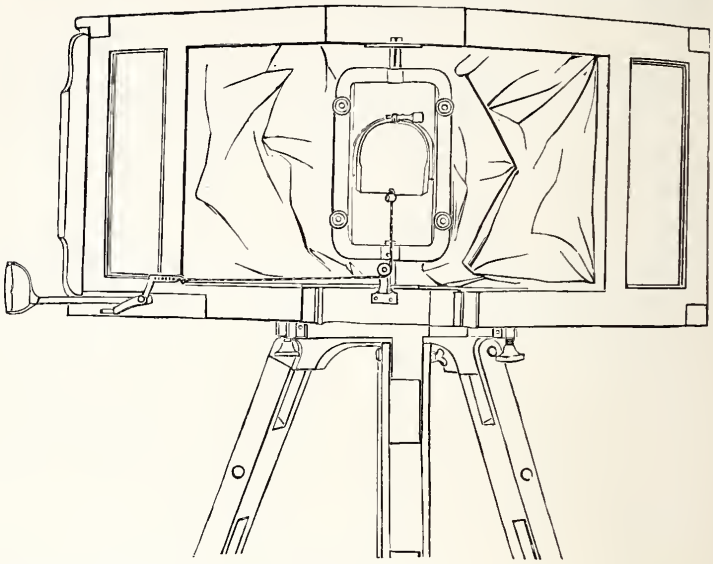
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1	8x10 Morrison Full Figure Lens	$90 00	$45 00
1	6 in. 4-5 Instantaneous Morrison Wide Angle Lens with Shutter	25 00	10 00
1	No. 3 Morrison Leukoscope, 16x18, Portrait Lens	150 00	60 00
1	6 in. Morrison Detective Lens	25 00	8 00
1	5/8 W. D. Lens, of the celebrated makers, Bertiner, of France	30 00	15 00
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1	No. 1 Darlot Wide Angle Lens	12 50	6 00
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1	4x5 Dallmeyer Rectilinear	34 00	20 00
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1	No. 1 Dallmeyer Wide Angle Lens	34 00	25 00
1	4-5 French Lens, made by the celebrated O. Simon	25 00	10 00
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1	2/3 Quick Worker Portrait Lens	75 00	25 09
1	5x8 Single W. A. French Lens	25 00	10 00
2	Brickeman Triple Combination Single View Lens	55 00	21 50
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1	A. O. Co. Portrait Lens, 8x4	300 00	95 00

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1	6 in. " " "	54 00	10 00
1	3 in. " " "	31 00	5 00
1	2½ in " " "	27 00	3 50
1	½ in. " Quick Worker	50 00	10 00
1	⅔ in. " " "	75 00	15 00
1	No. 3 Ratio Lens	350 00	80 00
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1	4-5 Rapid Single Lens	20 00	8 50
1	5x7 " " "	32 00	12 50
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1	No. 1 B Steinheil Lens, Series VI	105 00	70 00
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1	11 in. Optimus, Br. W. D. Lens	72 50	80 00
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2	¼ size Scovill Portrait Lens, Waterhouse Diaph., Rack & Pinion	8 75	4 00
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1	8-10 Economic Lens	20 00	7 50
1	4-5 Swift Rapid Paragon Lens	32 75	20 00

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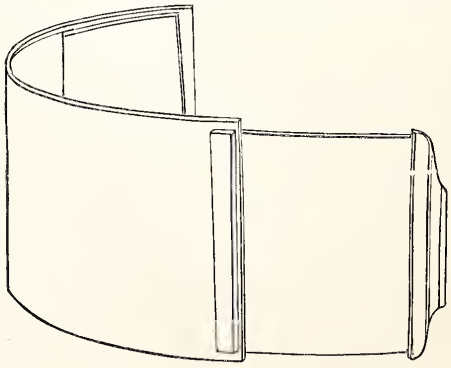
The Scovill Panoramic Camera.



WE take pleasure in introducing to the photographic fraternity our new Panoramic Camera, which is made in various dimensions up to the size capable of making photographs 18 x 48 inches.

A new design of constructing these cameras in hemispherical form has been invented; a new movement of crossing the lens over the segments of the circle, and an automatic release for the shutter has also been constructed. Carbutt's No. 27 films, or his orthochromatic films of the same sensitiveness, are used by means of an ingeniously constructed flexible dark slide, which permits of the necessary curve to conform with the back of the camera. The cameras are solidly and serviceably made, elegant in finish, and in every way maintain the world-wide reputation of the American Optical Company. The cuts shown herewith give an idea of the external appearance of the camera, and the dark slide for holding the film.

The prices of these cameras, including in each case a substantial wooden box or trunk for holding the instrument, a suitable tripod, a panoramic printing frame, two holders, two developing baths, and the celebrated Swift lens, are given below.



Price of The Scovill Panoramic Outfit for making photographs 10x30 inches, complete as above, - - - - $250

Price of The Scovill Panoramic Outfit for making photographs 16x43 inches, complete as above, - - - - 300

THE

SCOVILL & ADAMS COMPANY,

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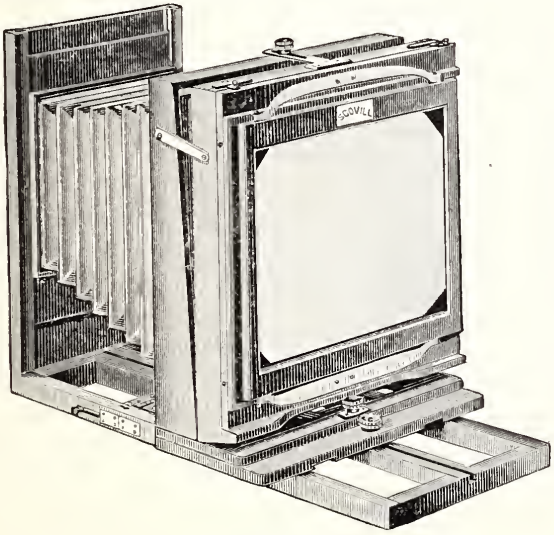
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Made by the AMERICAN OPTICAL CO.,

To meet the demand for high-grade apparatus at popular prices.

This Camera is made of highly polished mahogany, with all the latest improvements, and patent self-adjusting ground glass frame, reversible back and rising front.



. . PRICES. . .

6½ x 8½	Double Swing,	- - - -	-	$23 00
8 x 10	" "	- - - -	-	25 00
11 x 14	" "	- - - -	-	35 00
14 x 17	" "	- - - -	-	50 00

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MAX LEVY'S ENGRAVED SCREENS

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AUSTRALIA—Sydney: Harrington & Co.
JAPAN—R. Konishi, Tokio.

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A PERFECT ANASTIGMATIC LENS for Process and General Work, Is the best companion to the LEVY SCREEN, and is sold in America only by

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Plates
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None better

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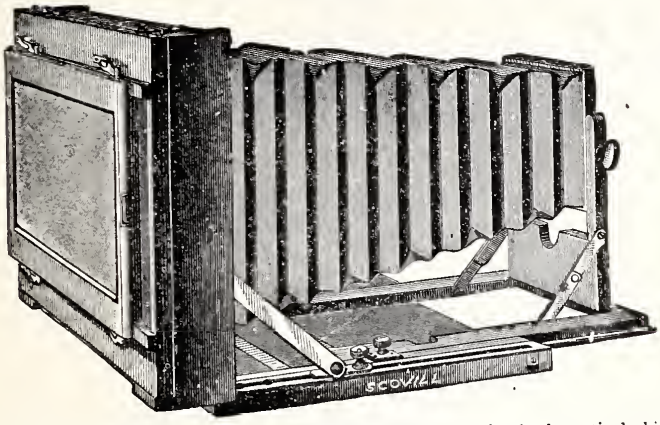
EVERYTHING for the AMATEUR and the PROFESSIONAL

Facts Worth Considering.



IRVING VIEW CAMERAS.

The IRVING Camera recently introduced by the American Optical Co. was awarded the highest prize by the judges at the American Institute Fair. They expressed themselves as unable to see how a more complete, compact, light, handsome and serviceable camera could be made.



The Irving Cameras all have swing front in addition to swing back, vertical shifting front board. They have the Howe patent reversible back, fitted with self-locking ground-glass frame, and when desired, celluloid is used in place of glass for the focusing screen.

One of the best features of the camera is the absence of detachable screws. An idea of this is conveyed by the illustrations showing the camera when extended and when folded.



A superb canvas case, the finest ever made, is supplied with each one of the Irving Cameras. Price list is as follows:

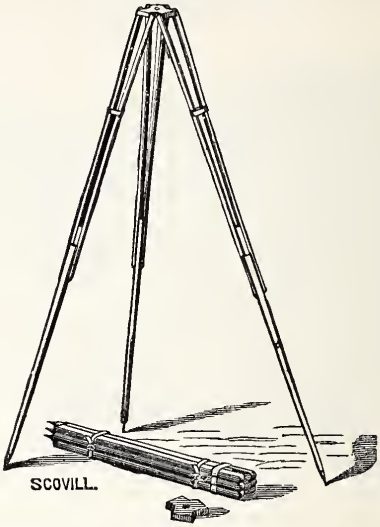
	Single Swing.	Double Swing.
4 x 5	$27.00	$32.00
5 x 7	33.00	38.00
5 x 8	35.00	40.00
6½ x 8½	40.00	45.00
8 x 10	45.00	50.00
10 x 12	60.00	$65.00
11 x 14	65.00	70.00
14 x 17	75.00	80.00
17 x 20	85.00	90.00
18 x 22	95.00	100.00

In order to convey an idea of the lightness of these cameras, it is sufficient to say that the 5 x 8 size camera weighs only 3 lbs.

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

The Scovill Adjustable Tripod.

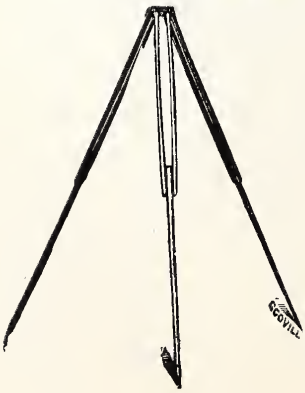
(FEATHER WEIGHT.)



Nothing more compact, certainly nothing as graceful in appearance and light in weight as the new Tripod for out-door Photography, just produced by the American Optical Company, has yet made its appearance. Because so readily adjusted to the utmost irregularity of the earth's surface, it was decided to call it the "Adjustable Tripod." Lady amateurs prefer it to any other pattern on account of its lightness and beauty. The top is covered with billiard-cloth to prevent marring the fine polish on our cameras, and the clamping screws are not detachable.

SCOVILL ADJUSTABLE TRIPOD.

No. 1..... Price, each, $3.50
" 2..... " " 5.00



Scovill Adjustable Jointed Tripod, to fold and pack in a 22-inch Valise..... $4.00
Do. with Canvas Bag and Handle.. 4.75

THE IMPROVED TAYLOR TRIPOD.

The illustration here presented makes an extended description unnecessary. Suffice it to say that this tripod is very firm when set up, and folds up compactly by simply pressing together the two upper joints of each leg, thus unsetting them from the pins on the brass top and then doubling them over on to the third joint. This movement is naturally reversed when placing the tripod in position to support the camera.

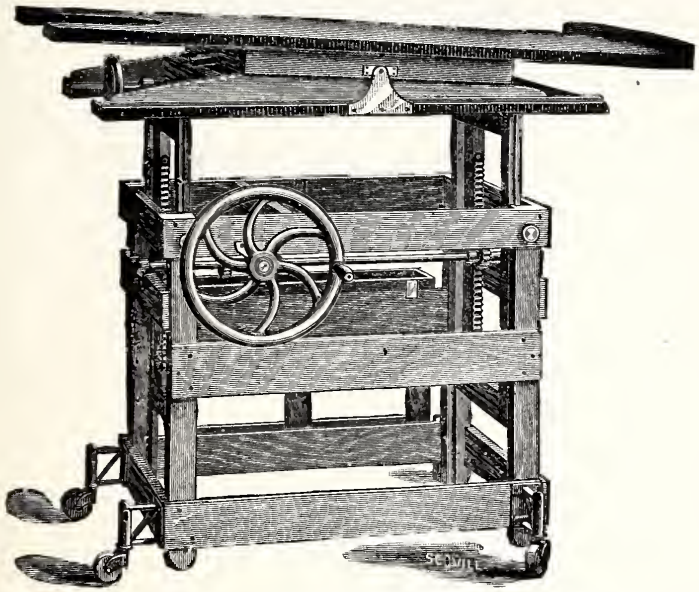
Price, with metal disc and non-detachable screw.....$2.25 each.

Adapted for cameras from 1-4 to 8x10 size.

THE

"ELITE" STUDIO STAND.

(PRIZE WINNER.)



Patented.

These are the only Stands suited in workmanship and finish, also in size, to the large American Optical Co.'s Cameras, with their great length of bellows and extension platform. Practical portraitists cannot fail to admire the ease with which these stands can be adjusted at any desirable height or inclination, and the noiseless manner in which they may be moved from place to place, their elegant appearance and accurate construction.

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"ELITE" STUDIO STANDS

	No. 1 Size.	No. 2 Size
PRICE, with Rack and extension for Plate Holder	$32.00	$36.00
Highest point from platform to floor	48	48
Lowest " " " "	32	32
Width of platform	22	26
Length of platform without attachment	45	52
" " with "	60	70

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TAKEN WITH SERIES III. GOERZ LENS (*see next page*).

Series III.

Goerz's Double Anastigmat F:7.7.

For portraiture and rapid out-door work.

No.	Equivalent Focus. *in.*	Free Aperture. *in.*	Size of Plate Sharply Covered at F:7-7 *in.*	F:15-5 *in.*	F:62 *in.*	Code Word.	Price, With Iris-Diaphragm.
00	3¼	½	3x3	3¼x4¼	4x5	Cadiz	35 50
0	4¾	5/8	3¼x4¼	4x5	4¾x6½	Caesar	37 50
1	6	⅞	4x5	4¾x6½	5x8	Calderon	45 00
2	7	1	4¾x6½	5x8	7x9	Calla	51 50
3	8¼	1¼	5x8	6½x8½	8x10	Calvin	62 50
4	9½	1 5/16	6½x8½	7x9	10x12	Camerun	75 50
5	10¾	1½	7x9	8x10	12x15	Camillus	91 00
6	12	1 5/8	8x10	10x12	16x18	Canada	107 00
7	14	2	10x12	12x15	18x22	Capet	140 00
7a	16½	2⅜	11x14	13x17	21x25	Caviar	182 00
8	19	2⅝	12x15	16x18	22x25	Carlos	219 00
9	24	3 5/16	16x18	18x22	24x30	Census	325 00
10	30	4¼	18x22	22x25	28x36	City	539 00
11	35	5	22x25	24x30	34x44	Columbia	1070 00

Series IV.

Goerz's Double Anastigmat F:11.

RAPID COPYING LENS.

For full-size reproductions, enlargements, large groups, landscapes, instantaneous photography and interiors.

No.	Equivalent Focus. *in.*	Free Aperture. *in.*	Normal Size of Plate for Copying at F:15.5 to F:22 — In Life Size. *in.*	In Reduced Size. *in.*	Size of Plate Covered at F:15.5 — For Groups *in.*	With smaller stops for landscapes, interiors, etc. *in.*	Code Word.	Price, With Waterhouse Stops.
6	12	1 1/16	16x18	10x12	10x12	16x18	Damara	$110 00
7	14	1 5/16	18x22	12x15	12x15	18x22	Darius	141 50
8	19	1¾	22x25	16x18	16x18	22x25	Dekan	230 00
9	24	2⅛	24x30	18x22	18x22	24x30	Dictator	345 00
10	30	2¾	28x36	22x25	22x25	28x36	Dolomit	565 00
11	35	3¼	34x44	24x30	24x30	34x44	Doria	1096 00
12	47	4 5/16	40x60	28x36	28x36	40x60	Drusus	1980 00

New Sector Shutter.

(GOERZ PATENT.)

THIS new shutter is formed by segments situated in the plane of the diaphragm, and opening from and closing towards the centre. This Shutter not only combines the good qualities of the best systems of shutters hitherto known, but actually surpasses them in many respects.

Its advantages are as follows:

1. **Simplicity of mechanism,** hence permanently uniform and reliable action.

2. All moving parts are **completely covered** in, hence they are not susceptible to disturbing external influences, such as concussion, dust, moisture, etc.

3. It can be fitted **between lens systems which have very little separation from each other** (*e. g.*, double anastigmats with short focus), as the segments are one-tenth of a millimetre only in thickness,

4. After opening with the greatest velocity, it will remain for a certain period in this fully-opened position, thereupon closing with the same rapidity. Hence the Lens will work during the greater part of the time of exposure **with the full size of opening for which it is set.**

5. It will work without any shock or jerk, and permits, with certainty, great variations of speed, ranging from $\frac{1}{150}$ to one second. The speeds marked on the shutter are absolutely reliable, and will apply equally for any adjustment or "size of stop." In most shutters hitherto known the speed will vary with the "size of stop" for which they are set, even without any alteration of the speed adjustment.

6. It serves at **the same time as a "stop"** and can be adjusted for any desired "size of aperture."

7. It is set for action **without opening** it in doing so.

8. It is perfectly light-proof, its manipulation is most simple, and it is very light, being made of aluminium (Nos. 1 to 4 weigh $2\frac{3}{4}$ ounces only); it occupies very little space. (See illustration showing full size). The workmanship is most perfect.

The Shutter being fitted between the Lenses, it is necessary that it should be well centred with them. We cannot guarantee faultless mounting unless the Lens, whether of our make or of any other, is sent to us for fitting.

So far, the segmental Shutter is made in the following sizes only, suitable for Lenses as stated below:

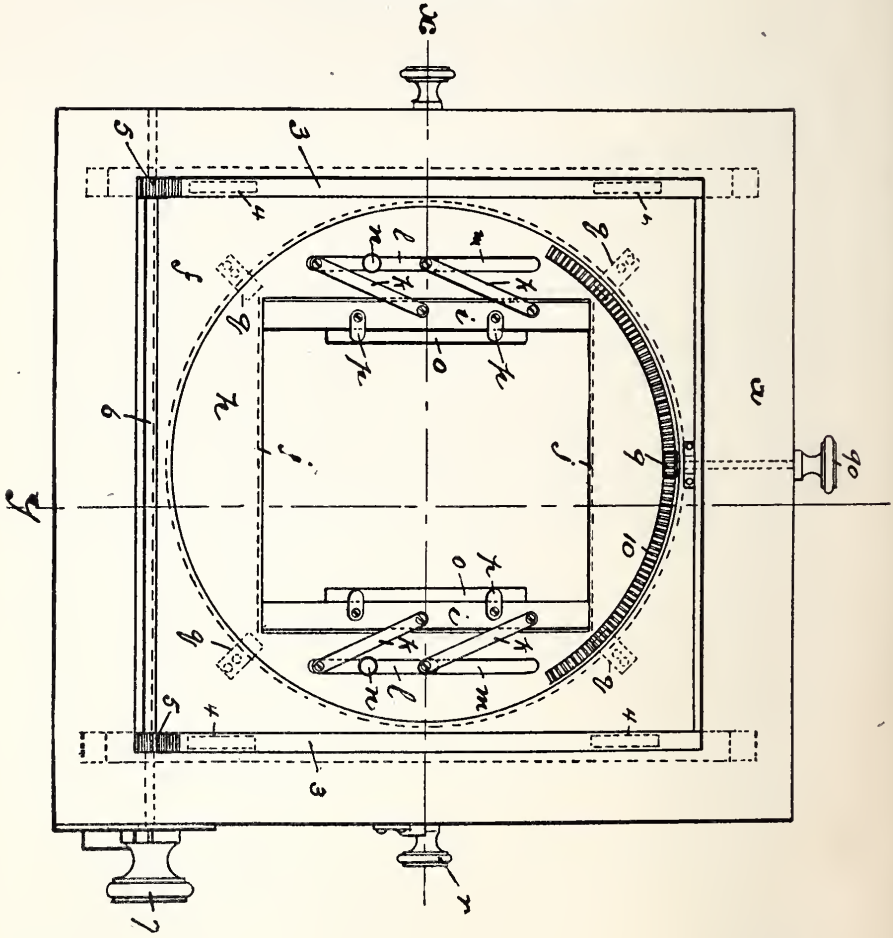
Size of Shutter.	Diameter of Lens Tube.		For GOERZ'S LENSES. Series and No.	Price
	mm.	in.		
1	34	$1\frac{3}{8}$	Double Anastigmat III/0	$22 00
2	34	$1\frac{3}{8}$	Double Anastigmat III/1	22 00
3	38	$1\frac{1}{2}$	Double Anastigmat III/2	22 00
4	44	$1\frac{3}{4}$	Double Anastigmat III/3	22 00

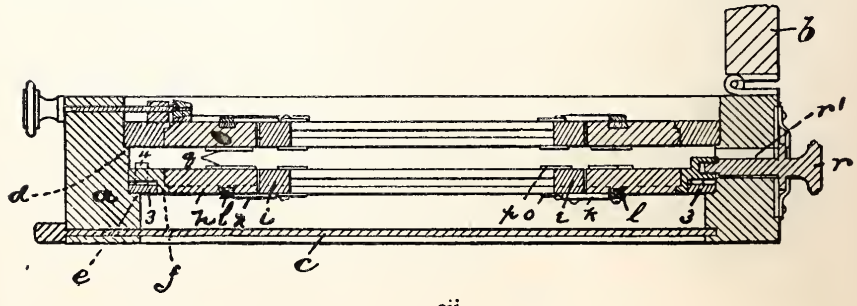
The Shutter can also be fitted to any other Lens with a similar diameter of tube, provided that the largest size of stop is not more than 24 mm (= 1 inch) in diameter. Cost of fitting, $1.50 to $2.50 each, according to size. The original Lens Tube is not altered and will be returned.

No charge will be made for fitting if the Shutter is ordered *simultaneously with* one of our Lenses.

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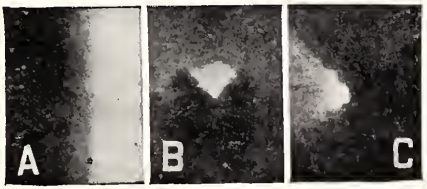
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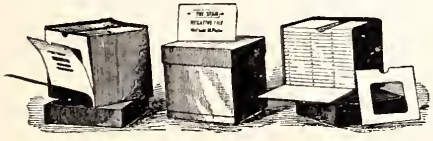
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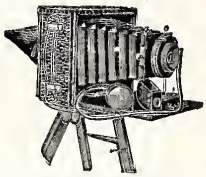
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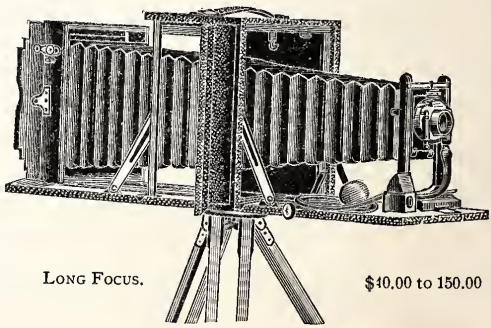


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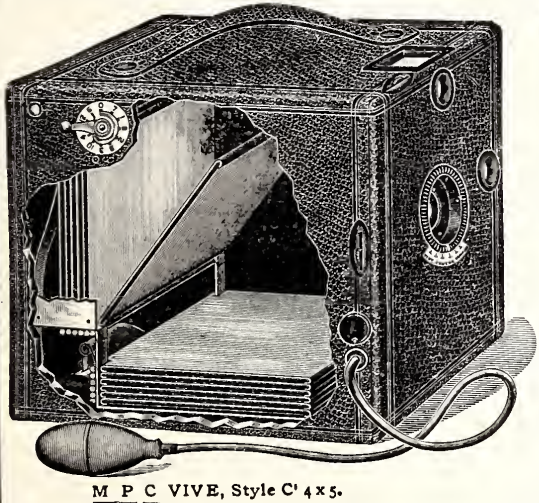
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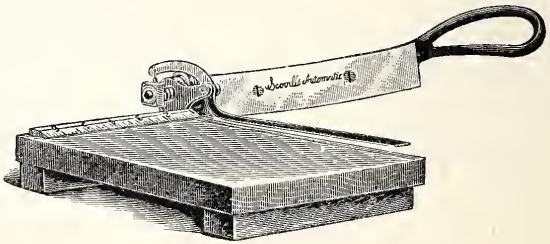
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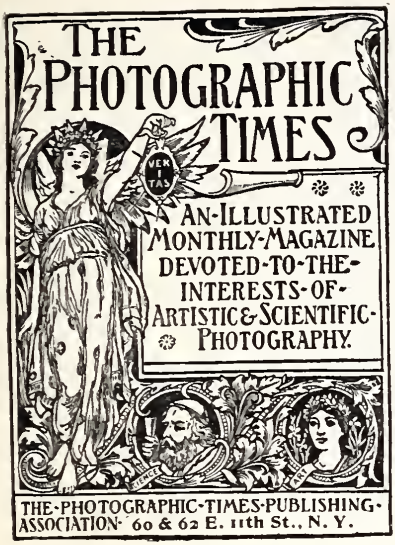
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